Vol. XLVII

FEBRUARY 22nd, 1945

FLIGHT

and

AIRCRAFT ENGINEER

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HERCULES

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The now world-famous Lancaster heavy bomber established a reputation for outstanding performance within a very short time of its initial operational appearance. Today, after three years of front-line operational duty, this bomber continues to hammer enemy industry and communications, whilst past successes against specially selected pin-point targets provide many of the highlights in the aviation history of the war. "Bristol" are proud of their contribution to the efficient performance of this powerful aircraft . . . for the Lancaster II --as with many other front-line bombers—is powered by four "Bristol" Hercules sleeve-valve radial engines . . . giving support for the assertion that the single sleeve-valve will be the principle behind the power of large post-war planes too.

"Bristol"

The single sleeve-valve principle was pioneered & developed by "Bristol"

THE BRISTOL AEROPLANE COMPANY LIMITED

FLIGHT
and
AIRCRAFT ENGINEER

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

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The Outlook

Operational Automaticity

IN our issue of February 8th we made a plea for all-weather air war and suggested that tactical operations in fog might not be so far off as would appear at first thought. With this in mind it was interesting to note the Air Ministry's official announcement concerning tactical air support during the early stages of the battle for Cleves.

In this announcement it was stated that Mitchells and Bostons of Air Marshal Sir Arthur Coningham's Second Tactical Air Force had bombed, by means of instruments through ten-tenths cloud, enemy concentrations only a thousand yards from our front line. At the end of the attack a momentary break in the clouds showed the bomb-aiming to have been accurate.

This is the first time that such a statement has appeared in an official communiqué, and it is of great significance in view of the trend towards more and more operational "automaticity." Assuming that the attack was made at about 240 m.p.h., the apparently blind bombing was going on just 8½ seconds' flying time away from our own troops. This is no mean feat and reflects the utmost credit on the precision of the instruments and the training of the aircrews.

It is also interesting to speculate on the development of more and more automatic aids. Shall we eventually see aircraft of Bomber Command replaced by the highly developed and accurately guided flying bomb, or will the Halifaxes and Lancasters of the future be huge aircraft, carrying enormous bomb loads, entirely under automatic control? It is not difficult to visualise the outlines of such aircraft. They would be perfectly streamlined because there is no crew to be accommodated, and no nearly vertical surface required to provide view for a pilot. All of them would carry television sets continually transmitting some interpretable representation of the ground below. The bomb-aimer would be a controller sitting in an armchair hundreds of miles away. Who would say this is far-fetched in light of the known fact that instrument-bombing by a good operator is already more accurate than visual bombing by an average bomb-aimer?

We have come a long way in operational technique during the short thirty years of experience since 1914. We have passed from the lone Sir Galahad of the air on a roving commission to the highly organised saturation attack of to-day in which, perhaps, the equivalent in numbers of an infantry division is airborne in unison to destroy a pin-point target—hundreds of miles from base—which they never see.

The Brotherhood of the Air

"THERE is something in the air which brings airmen together when they fly together." So said Lord Trenchard when moving in the House of Lords last week that steps should be taken to preserve after the war the brotherhood in arms which in the past five years has grown up between men of the R.A.F. (including those from the Dominions) and the Allied airmen who have fought and worked beside them—Norwegians, Dutch, French, Belgians, Poles and Czechs. To maintain this warm feeling would, Lord Trenchard believed, be one measure for helping to maintain peace.

The plan he proposed was, as he said, very simple. Let there be so many selected airfields in each of the Allied countries on which a squadron from one of the others should be free to land without getting special passports or worrying Foreign Offices. He also pleaded for uniformity of training, of airfield control, and of organisation into fighters, bombers, etc. He suggested a grouping in the west of Britain, France, Belgium,

Holland and Norway. There might be other groups.

The Lord Chancellor, on behalf of the Government, welcomed the motion and advised the House to adopt it, which was done. He said that the Government had already been at work on the same idea. He referred to certain passages in the Dumbarton Oaks proposals.

Everyone will agree that for the sake of future peace it is most desirable to foster the friendly spirit which has grown up during the war between the airmen of the Allies who have fought side by side. Homogeneity in training, organisation and airfield control are of more practical, prosaical value. But as regards preservation of the friendship, Lord Trenchard's proposals could be expanded in various directions. For instance, a British and an Allied squadron of the same class might be permanently affiliated, might visit each other regularly every year, and might constantly exchange officers and other ranks for periods of service.

Supersonic Tactics

OUR war correspondent in his article "Mosquitoes of the 8th U.S.A.A.F." draws attention to the improbability—if not the impossibility—of a Mosquito reaching 700 m.p.h. in a dive to avoid a jet-propelled Me 262.

Speeds of fighting aircraft are now such that it has become customary to refer to their terminal velocity as a decimal fraction of the speed of sound, and it is probable that this speed limitation will have more and more effect on fighter tactics.

Instead of being concerned with manœuvrability, diameters of turning circles and how to defeat g-black-out, it will, in the future, be much more important to know whether the terminal velocity of the enemy fighter is, for instance, 0.8 or 0.825 of the speed of sound. Quite obviously, provided a pilot sees him before he can get close, an enemy fighter of the same terminal velocity can never catch up in a straight run or dive. In fact, it appears as if the old tactics are completely reversed. Whereas it has always been considered fatal to break off a dog-fight and fly straight, it will now become equally foolish to do anything but run straight and hard with the machine as near terminal velocity as controls allow.

Eventually, of course, new streamline shapes—probably with extremely sharp entries, and maybe even controllable—will appear. Then we shall be travelling faster than the noise we create.

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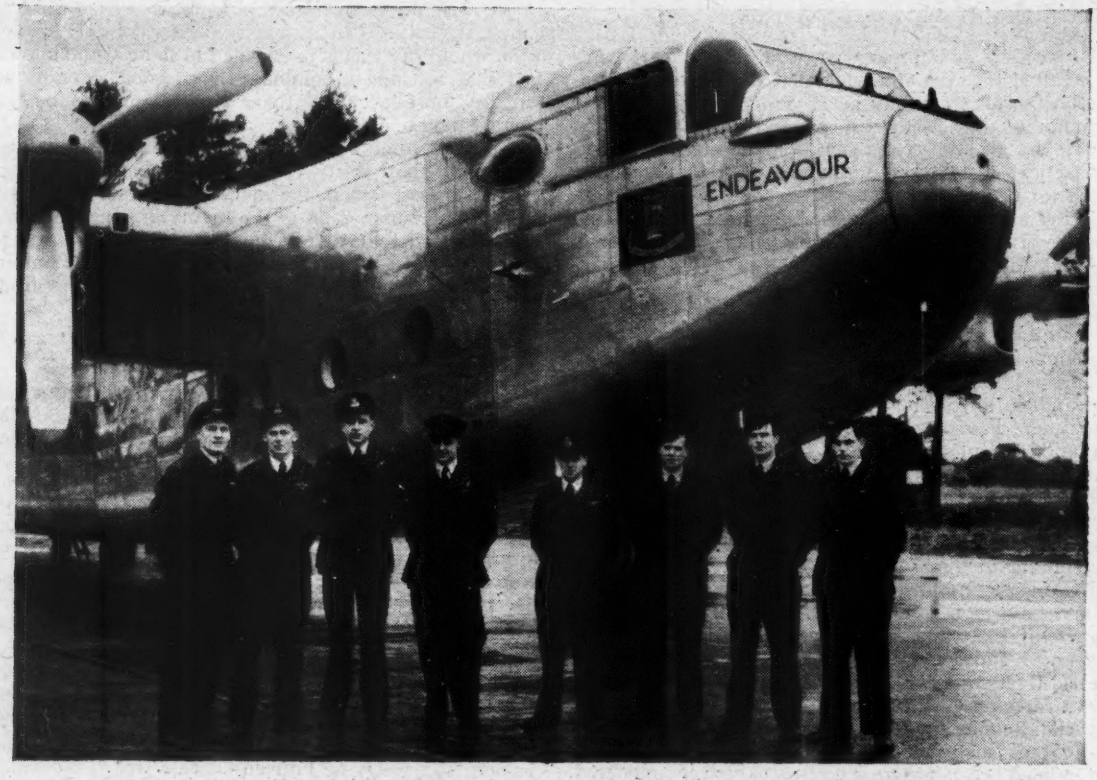
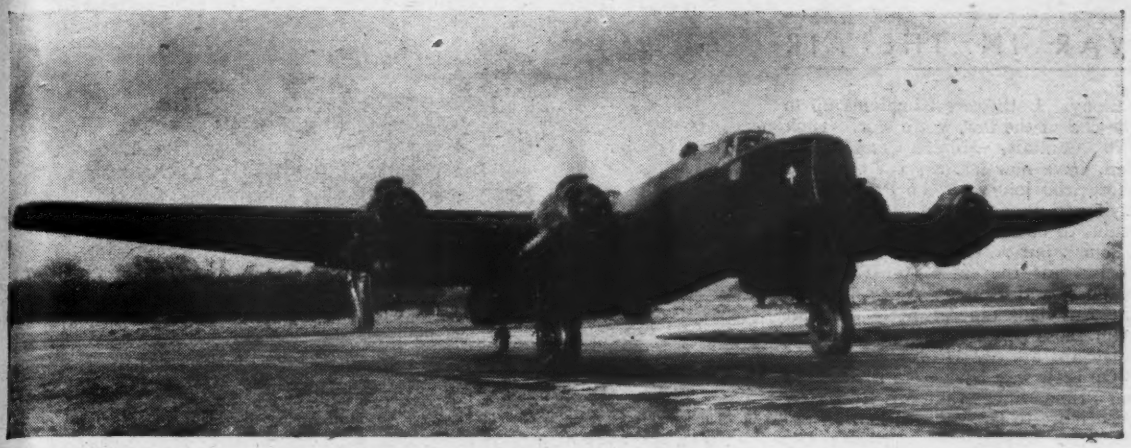


ROYAL ENDEAVOUR: The crew of H.R.H. the Duke of Gloucester's personal York which he will use as Governor-General of Australia. Left to right: Wing Cdr. D. R Donaldson (Capt of the Flight), Flt. Lt. J. A. Critchley, D.F.C., F/O. J. G. Earl, F/O. K. W. Miller, P/O. L. E. Welldon, Sgt. Allen and Cpls. Robertson and Houston. A description of the *Endeavour* appears in a special supplement in this issue.



A Handley Page Halifax III of the French bomber squadrons operating from Britain under R.A.F. Bomber Command.

WAR in the AIR

Fall of Budapest : The Bombing of Dresden : Help from the West for Russia : U.S. Fleet Bombing of Japan

WAS the decision to fight for Budapest one of Adolf Hitler's intuitions? It has cost him 12,700 men in prisoners of war alone (a useful-sized army) apart from the numbers killed; and to this total must be added the great efforts made to relieve the place, which took up the time of strong forces, badly though they were needed elsewhere, and caused another large total of casualties.

Anyway, the Capital of Hungary is now firmly in Russian hands, and such prestige as the German Army still possesses has received another severe shock. It is not to be supposed that the Russians have not themselves lost many men in this hard fighting; but now Russia has brought her enormous man-power into play; while the Germans are beginning to suffer from a shortage and cannot afford casualties on a large scale. Their armies in East Prussia and Pomerania appear to be already as good as lost to them.

Once again the British and American aircraft have flown out to give tactical help to the Russian forces. Breslau is now surrounded and Marshal Koniev has by-passed it and pressed on westwards. The centre behind the German front on this sector was Dresden, the Capital of Saxony, famous for its elegant china pottery. It is the centre of a railway network and is a great industrial town. If the Russians had developed the art of strategic bombing themselves, Dresden would have been the natural place for them to raid at this juncture. But that is a job which Bomber Command and the U.S. 8th Air Force can do with much greater efficiency, after their long experience and their study of the subject. So one night last week a strong force of Bomber Command flew there—in fact, there were two attacks by the Command in the same night. This time, as on many previous occasions, the bombers relied on fire rather than on weight of bombs to do their work, and some 650,000 fire-bombs were showered down on the industrial parts of the city. H.E. bombs were not entirely absent, and a number of 8,000-pounders were released as well as hundreds of 4,000-pounders. Dresden had evidently not expected this, and there was only a small amount of *flak*.

No Peace by Day

LONDONERS will remember how in the great Blitz of 1940-41 the "All Clear" sirens used to go just before break of day; and the citizens felt safe for the next 12 hours or so. Probably the people of Dresden felt much the same when the British heavies left in the early morning. But the city's ordeal was not over. Soon after noon 450 Fortresses were over their city, picking out targets which the night bombers had not succeeded in hitting. They found many of the fires still alight. One can understand that after Dresden had had immunity from air raids all through the war, the civil defence services were not at the highest pitch of efficiency.

After Prussia, the two most important former States which have been absorbed into the German Reich are Bavaria and

LONG DOZEN: A salvo of bombs leaves the racks of a Marauder of the U.S. 9th Air Force.

WAR IN THE AIR

Saxony. Both were Kingdoms up to the end of the first world war. Their two Capitals, Munich and Dresden, have now learnt what comes to those who join with the Prussians in trying to dominate the world. It remains to be seen what will happen to Vienna; but Austria was overrun by Hitler in the most unscrupulous manner, and British feelings towards the Austrians are distinctly different from those concerning true Germans. Austrians are not Huns.

On their way back from the Crimea our Prime Minister and Mr. Eden flew once more to Greece, and had an enthusiastic reception in Athens. Aircraft certainly help the diplomatic as well as the operational side of war. Everyone hopes that now a new era of peace and prosperity lies before the Hellenes. E.L.A.S. has committed horrible barbarities; but what we want to remember about the Greek people is the magnificent stand they put up against the Italians before the Germans interfered.

Blow After Air Blow

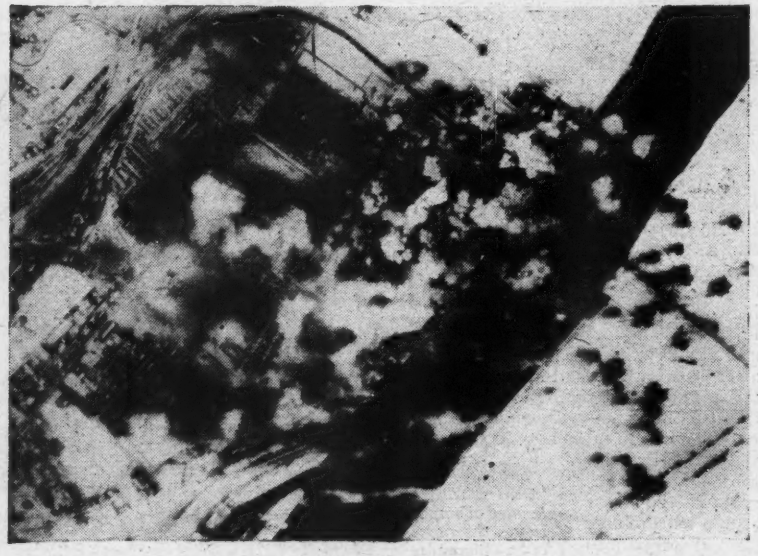
TWENTY-FOUR hours did not see the end of Dresden's tribulations. The blows were followed up by other raids from the air. The effort of the British and American Air Forces has reached heights which make the reader gasp. It is useful to cast one's mind back and remember the sensation caused in this country by the first 1,000-bomber raid on Cologne some couple of years ago. A raid by 1,000 machines is now a commonplace; but one can still be astonished by the way in which the numbers of bombers regularly despatched against Germany has recently swollen, and continues to swell. In 36 hours last week the attack was made by between 12,000 and 13,000 machines, both British and American, based in Britain, Italy, Holland, Belgium, and France. Altogether they dropped about 14,000 tons of bombs on Germany, the vast majority of which were aimed at railways and other transport targets.

One has often pondered on the problems set to the German High Command by the simultaneous attacks from East and West. On what principle was the Command to move troops about? Which was the most dangerous front? It almost looks as if the questions will presently be settled by the Allied bombers, and that no movements at all will be possible.

Side by side with the attack on transport goes the attack on oil, which means that the roads can be no adequate alternative to the railways. They never are an alternative, where long hauls are needed; they only serve for tactical reinforcements just behind the front of a battle. But oil is also necessary for the movements of tanks, armoured cars, and self-propelled guns, without which a modern army cannot fight with any effect. It has lately been announced that the bombing offensive has deprived the Germans of four-fifths of their oil production.

The Germans raged and raved at the terms of what has been called the Crimea Charter, declaring that they would fight on to the end. But it looks as if soon they will be left with very little in the way of fighting material. They cannot halt Eisenhower or Zhukov or Koniev with bows and arrows or with bare fists.

A JAP NIPS IN! A Superfort burns furiously after a Japanese air attack on the American base on Saipan. Most of the attacks on Tokyo start from Saipan.

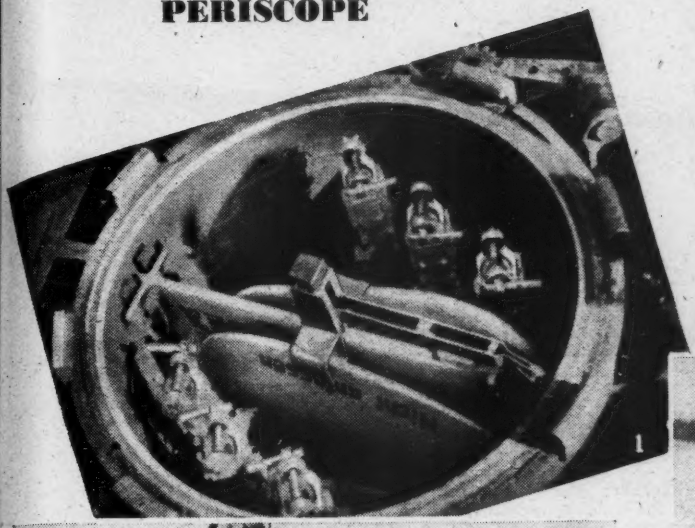


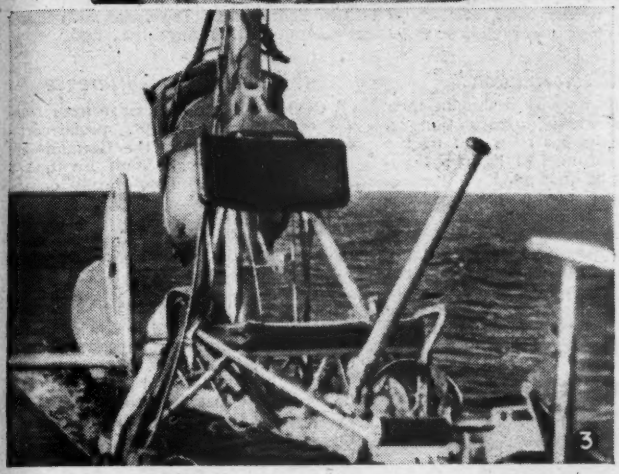
WORMS' EYE VIEW: A concentration of bombs bursts on the railway bridge over the Rhine at Worms. The attack was made by Liberators of the U.S. 8th A.F.

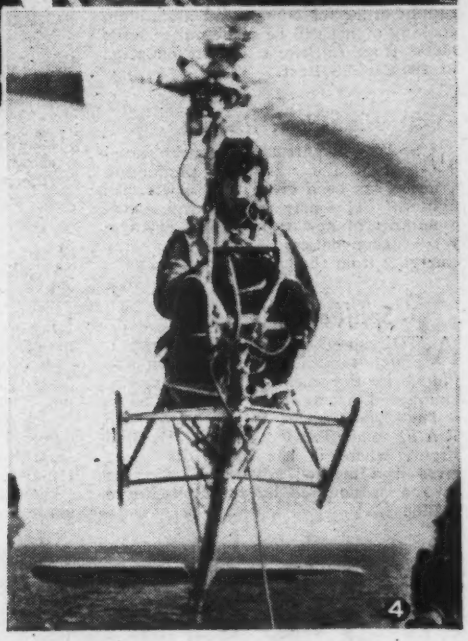
Mud and Rivers

THEY have still got some resources, obviously; but at the present time their chief ally is mud. That is slowing down the advance of Eisenhower's men in the West, and Zhukov's men in the East. But then, Koniev is already well beyond the upper reaches of the Oder, and is extending his conquests. Rivers have never yet stopped the Russians, and some authorities hold that in a major war a river has never yet proved an impassable barrier. It is a useful national boundary, and Marshal Foch was urgent in 1919 that France's eastern boundary ought to be the Rhine. As a boundary, it may not be permanently defensible; but at least it is an obstacle to a sud-

U-BOAT FLYING PERISCOPE







Four views of the Autogiro kite which the Germans have used as an experimental look-out for their submarines. It has no motor and is kited off by running the U-boat into wind. Presuming a height of 400ft. the added vision would be about 20 to 25 miles. The rotor blades are about 12ft. span. Obviously it can only be used where surface ships alone are expected and the enemy are optimistic in thinking there is now any area of sea not covered by Coastal Command. It is another piece of clever but useless complication, so beloved of the German.

WAR IN THE AIR

den surprise attack such as the German High Command likes to bring off when it enters upon a war.

In a way it is rather a relief to the mind to get away from thoughts of mud, and turn one's eyes to the Far East. Admiral Nimitz has announced that a powerful Task Force (an American expression which we like better than we like most Americanisms) of the Pacific Fleet has been attacking Japanese air bases and other military targets in and around Tokyo. The American Navy now seems to pay no regard at all to the Japanese battle fleet—and yet, not so long ago, Japan was regarded as a great naval Power. It has been suggested that the Japanese fleet would only fight in defence of its Home waters; but the Americans seem to be steaming about in them as they like, and sending the aircraft from their carriers to bomb targets in Tokyo and airfields in the vicinity. The Land of the Rising Sun is putting up a very good imitation of a twilight.

Air Support in Burma

FLIGHT offers its sympathy to our Russian Ally in the loss of the very distinguished General Cherniakovsky. In these days it is not often that the commander of a group of armies is fatally wounded in battle. This Jewish General was in command on the East Prussian front, and had displayed brilliant qualities.

One of the most active fronts now is that part of Burma where the Irrawadi takes a sudden turn to the west at Mandalay. The 14th Army has crossed the great river 30 miles to the west of the city which is the present objective, and there fighting is vigorous. The British and Indian troops have been supported by the largest concentration of artillery ever assembled in Burma.

There is also massive air support. It is of three kinds. Where the infantry are fighting a couple of Hurricanes can always be seen overhead, waiting to come down with bombs, rockets, cannon, or machine-guns in response to a call from the local commander on the ground. Their function has been described as "cab-rank" duties. Secondly there are squadrons available at one or two hours' call. These may be Hurricanes (either fighters or bombers), Thunderbolts, or Lightnings. Thirdly, there is the Strategic Air Force, whose Liberators and Mitchells work far behind the enemy's front.

HERE AND THERE

Putting the Me in Mess-tin

TWO light-metal firms in Jerusalem have recently received a large war supply order for copper and aluminium cooking utensils to be made out of scrap metal from *Luftwaffe* aircraft collected in the Middle East.

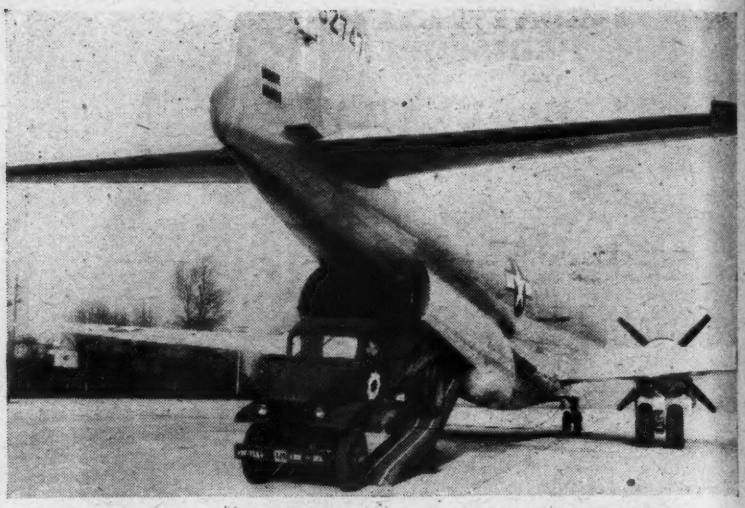
Hush-Hush Priority

U.S. War Department recently stated that "the highest production priority has been given to a new secret fighter." This may refer to any one of a number of new types—some of them very unconventional—which are now emerging from the experimental stage.

Spitfire XIV's Speed

A TOP speed of "about 450 m.p.h. and a tactical radius of about 300 miles" for the Spitfire XIV was officially announced last week.

The type, which is operating with R.A.F. 2nd T.A.F. on the Western Front, where it has found its speed gives it a marked advantage over the Fw 190, is powered by the Rolls-Royce Griffon LXV.



EXTRUDED: The 1½-ton truck emerging from the "goods entrance" of a C-97 shows the handling facilities provided by this cargo version of the Superfortress. Alternatively it can carry 100 troops or two light tanks. Top speed with four 2,200 h.p. Cyclones is claimed to be over 300 m.p.h., and range 2,000 miles.

Royal Recognition

A MESSAGE of good wishes in their future duties and congratulations on past achievements has been sent by the King to the personnel of Balloon Command, now to be disbanded.

In the course of his message, His Majesty said: "In our towns and cities many lives and many homes owe to you their preservation," and he specially mentioned the original auxiliary volunteers "who pioneered the way," and the airwomen of the W.A.A.F. who have "shown great devotion to duty and have made an outstanding contribution."

It'll Make No Difference

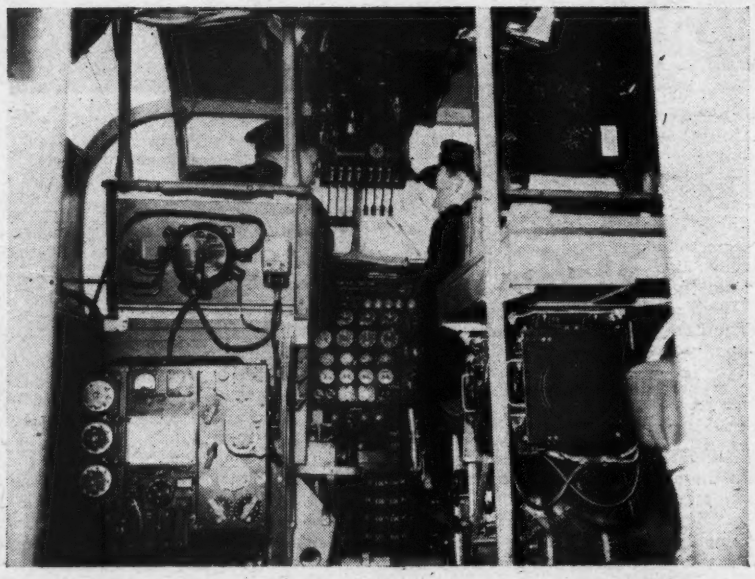
ACCORDING to a message from Duncan Hooper, *Reuter's* special correspondent in Moscow, the Germans are now using the Focke-Wulf Fw 190A/8 against Marshal Zhukov's army on the "Berlin Front."

This fighter is equipped with two 13 mm. machine guns, two 20 mm. cannon, and two 30 mm. cannon.

Honoured by Allies

CHINA and Poland have conferred more decorations on personnel of the R.A.F., R.A.A.F. and the S.A.A.F.

The Chinese "Cloud and Banner" (silver rosette) has been conferred by the President of the National Government of the Republic of China on Grp. Capts. E. S. Scott and E. A. Douglas-Jones, R.A.F., and on Wing Cdr. R. S. Allen (R.A.F.O.). The Polish "Cross of Honour" has been awarded to Capt. K. St. G. Hayward, Lt. A. F. Cloete (S.A.A.F.), F/O. P. F. Raw (R.A.A.F.), Flt. Sgt. E. W. Payton (S.A.A.F.), and Sgt. F. H. Williams (R.A.F.).



Wing Cmdr. Donaldson, captain of H.R.H. the Duke of Gloucester's Avro York *Endeavour*, is here seen becoming acquainted with his new charge and discussing her with his co-pilot. The radio operator sits behind and below the chief pilot and the navigator behind the co-pilot. Throttles, r.p.m. controls, undercarriage and flap controls are in the roof between the pilots; flying controls and instruments are duplicated and the engine instruments occupy the centre panel.

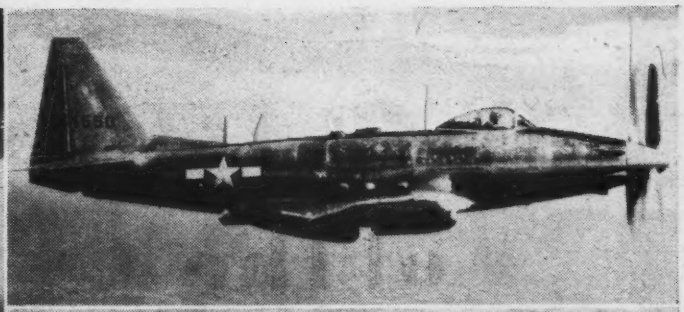
Wasted Man-power

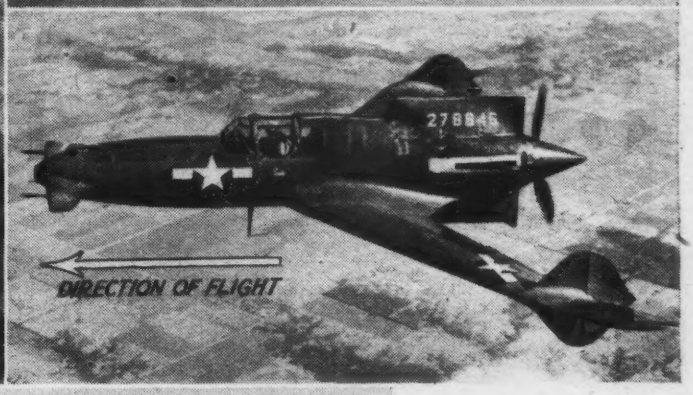
"MANY non-commissioned officers among the hundreds of experienced pilots and air crews and youths who have won their wings in Canada are to-day working as dock labourers and fruit pickers or clerking in base depots in Australia," according to a *Reuter* message from Brisbane.

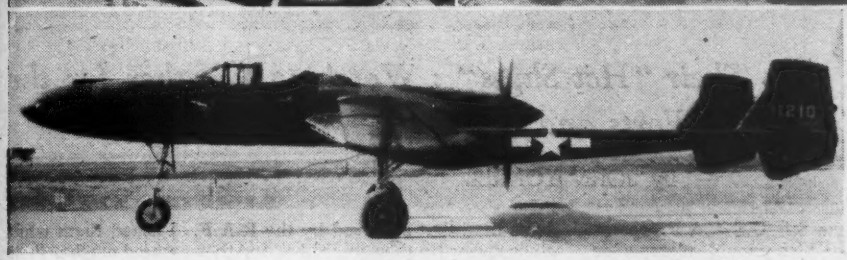
"The experienced pilots and air crews have come back to Australia within the past year after service over Europe and Africa. Some have been decorated after flying up to 2,000 hours. They have been posted to training and other depots or put to work outside the Service.

"Puzzled as to why they have been taken from theatres where, they say, there are plenty of 'planes, many of them are asking: 'If we are to be used as dock labourers and clerks, why not let us return to our studies or normal occupations?'

"They argue it would be simple to







AMERICAN EXPERIMENTS

Some Queer Designs Now Being Tried by the U.S. Army

(Top, left) The XP-67 A bat-winged twin-engined long-range interceptor fighter designed by the U.S. Army and known as the McDonnell. It has six 37 mm. cannon. (Top, right) The long-range XP-75 which started as a composite of various types. It has a 3,000 h.p. Allison liquid-cooled W-type engine behind the pilots and a contra-rotating airscrew. (Centre) The Curtiss XP-55 tail-first Ascender. Rudders are on the wing tips and the elevator controls on the nose. The airscrew can be jettisoned if the pilot has to bale out. (Bottom) The U.S. Army XP-54 which is a twin-boomed pusher type made primarily of magnesium alloy. The Lycoming is cooled by air entering the special wing slots.

HERE AND THERE

place them in a reserve from which they could be called up when needed. Most of them are anxious to be employed in war theatres."

Sir Frank Spriggs

SIR FRANK SPRIGGS, who underwent an operation recently, has left hospital but further treatment is still necessary and it is likely to be some weeks before he is back on duty. His innumerable friends in British aviation will join us in wishing him a complete recovery.

More Fields to Conquer

SOME two and a half years ago Mr. T. C. L. Westbrook joined the de Havilland Aircraft Co. to take charge of production. During the intervening period Mosquitoes have come off the production line at an ever-increasing rate, and the factories have been in full swing for a long time, largely due to his untiring efforts. We understand that the de Havilland company has now been able to release Mr. Westbrook to find other important fields to conquer.

An Anson for King Farouk

THE R.A.F. in Egypt has presented King Farouk with an Avro Anson as a birthday present. It is air-conditioned and luxuriously appointed, and bears the emblem of the Royal Egyptian Air Force upon its silver exterior.

Air Marshal Sir Keith Park made the presentation to King Farouk.

"Many Happy Returns"

ON February 19th, 1910, Sir George White, Bart., announced the formation of the British and Colonial Aeroplane Company. Sir George is no longer with us, but his descendants are worthily continuing the task which he began, although the title was changed later to the now familiar Bristol Aeroplane Company. Almost from the very start there were Bristol aircraft in use by the flying services, and from then to the present day the R.F.C. and the R.A.F. has never been without at least one type of service aircraft, often several simultaneously.

When the firm took over the Cosmos engines a period of development resulted in the Jupiter and a long succession of radial air-cooled, a class in which the company has established a fine reputation. *Flight's* association with the Bristol Company has always been of the most pleasant, and we look forward to the next 35 years with great expectations. "Shipshape and Bristol Fashion" is still the slogan at Filton.

Lt. Cdr. Hurren's New Post

LT. CDR. B. J. HURREN, who was released from the Fleet Air Arm late in 1943 to undertake special duties with S.B.A.C., is now leaving the society to take up an appointment with the Fairey Aviation Co., Ltd., in connection with public relations and air intelligence, as from March 1st.

Well known to *Flight* readers for his contributions on Fleet Air Arm subjects, Lt. Cdr. Hurren has often broadcast for the B.B.C. and is an authority on Naval air affairs, having served in Naval aviation before and during the war, and held special posts at the Admiralty and M.A.P.

Mosquitoes of the 8th U.S.A.A.F.

Americans Pleased with Their "Hot Ships" : Watching Weather for the Forts and Libs

By JOHN YOXALL

THE station from which the 8th U.S.A.A.F. operate their Mosquitoes is one which would please Gen. Eisenhower and his Deputy-Commander, Air Chief Marshal Sir Arthur Tedder. They are always most emphatic in their demand for co-operation between the Americans and ourselves, and no other station shows this feature to greater advantage. One sees Mosquitoes being serviced alongside Fortresses on the tarmac of a peacetime R.A.F. airfield, which was handed over lock, stock and barrel to the 8th U.S.A.A.F. The erstwhile R.A.F. officers' mess is now the American officers' club, and poker with money on the table replaces bridge with no money on the table. There is a small covey of pilots who wear the wings of the R.A.F. on their right breasts to show that their earlier war service was in that service. A liaison officer from the R.A.F. is also on the strength and, occasionally, a knot of R.A.F. airmen can be seen marching smartly to or from duty. They are familiar with the process of taking Mosquitoes on charge and checking the British equipment with which they are fitted.

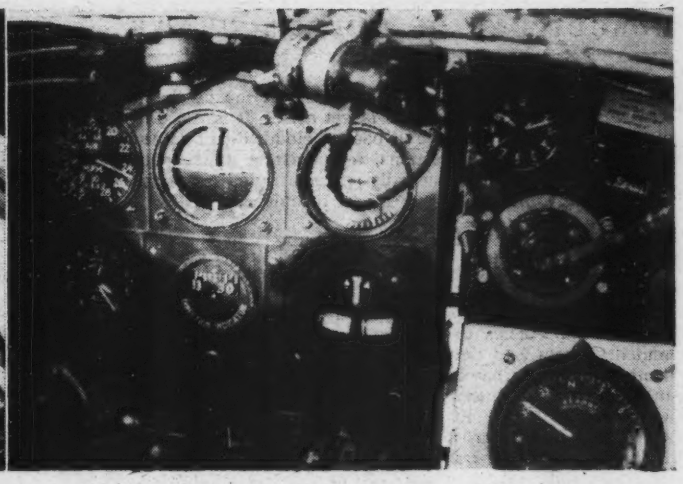
High Standard of Serviceability

The station (or group) is commanded by Col. Leon W. Grey, with Major A. E. Podwojski as Group Deputy-Commander. Major Roy Ellis-Brown—one-time flight lieutenant in the R.A.F.—brings his operational experience into use as Group Operations Officer. This post combines the duties of Wing Commander Ops and Wing Commander Intelligence in the R.A.F.

The Americans are quite frank in their praise of the "hot ships" and in their pride they manage to maintain an extremely high standard of serviceability. This is better, perhaps than that achieved by the R.A.F. I asked them what their major troubles might be, and they assured me that their only bother was to obtain crews good enough for the job. That was how they put it, but what they really meant was that they had some difficulty in getting pilots of the right temperament. But more of that anon.

When they were assessing the number of Mosquito XVIs which would be required for establishment and replace-

A mosaic map made by the Light-Weather (Mosquito) Squadron from photographs taken at night by the light of 700,000,000 candle-power flash bombs. The slight variation in tone is, of course, due to uneven illumination, caused by the fact that light intensity falls off as the square of the distance.

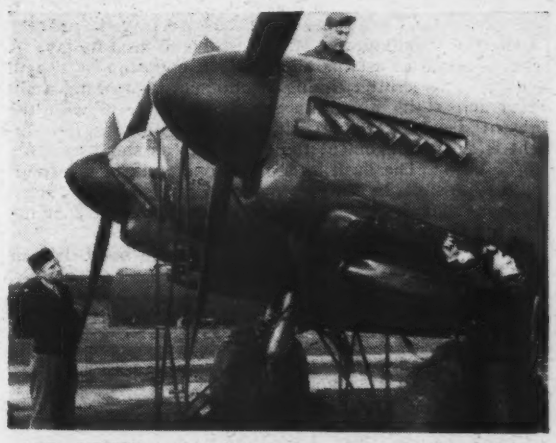


(Above) Major Ellis-Brown, D.F.C., one-time Flt.-Lt. in the R.A.F. The helmet and earphones are of British pattern because the Mosquito inter-com. is of standard type. (Right) Gently cruising on the way home from the Continent. Slightly losing height at 300ft. per min. Present height, 3,400ft. Speed, 250 m.p.h. Direction, 312 deg. Note the slight variation between the gyro direction indicator and the distant-reading compass on the right.

ment, the figure was put on the generous side because they expected that the casualty rate over Germany would be rather high. De Havilland's deliveries were to schedule, and casualties have proved to be lower than expected.

The units which go to make up the station, or group, as the Americans term it, are a Light-Weather Squadron, a Heavy-Weather Squadron, and a Training Unit. It must not be thought that the names heavy weather and light weather refer to the atmospheric conditions in which the squadrons work. It merely means that the one squadron flies Mosquitoes and the other flies Fortresses. The division of labour is roughly this: the Heavy-Weather Squadron does periodic trips out into the Atlantic for a thousand miles and back and at stated intervals along the route observations have to be taken from sea level to 24,000ft. The Fortresses employed on this work have been specially modified.

The Mosquitoes of the Light-Weather Squadron are used wherever the enemy are likely to be encountered or where speed is an essential. Four crews are always standing-by, ready to take off for anywhere from eastern Germany, Czechoslovakia, or Norway, down to the Spanish border.



THE OWNER: Col. Grey, who commands the station, watches his ground crew prepare his own pet Mosquito.

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or for a quick trip westwards. Usually it means that a weather front is approaching a target area. It is the duty of the crews to find height and base of cloud, direction and speed of front, icing conditions, temperatures and general information. The trip usually entails flying into and through the front to get a check on turbulence.

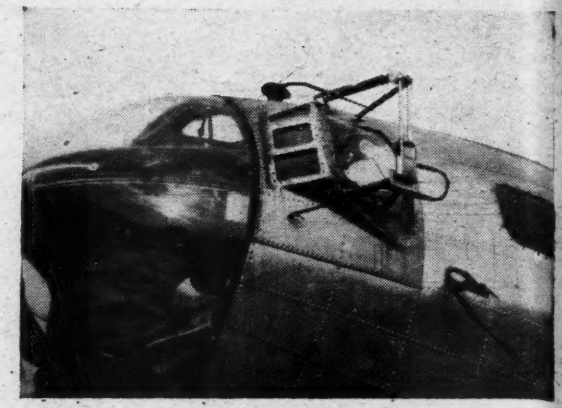
Navigational Accuracy

One trip was made by Capt. R. L. Lee with Lt. W. A. Biggers as navigator. The job was to test long-range navigation equipment over various areas. They flew from England via Corsica to San Severo, in Italy, where they landed. From San Severo the Mosquito went on experimental trips to Varna on the Black Sea, Belgrade, Budapest and Vienna. At all these points the navigational fixes were within one half-mile to one mile of the actual spot over which the aircraft was flying.

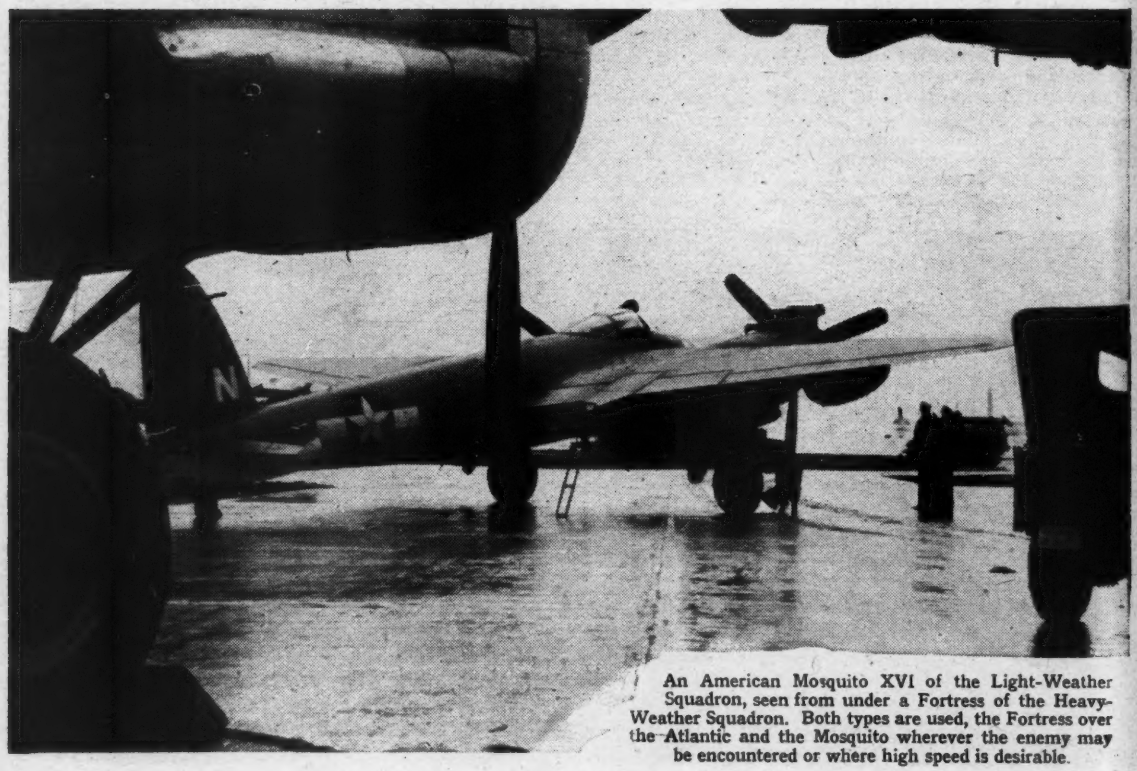
This accurate long-range navigation ties up with another important duty carried out by the Mosquitoes, and that is night photography. In this work it is safe to say that the Americans are well ahead of the rest of the world. As long ago as March, 1929, they were taking experimental air photographs by flashlight over the Capitol and developing and printing the finished pictures on board the aircraft. The small flashlight used then has developed into the 700,000,000 candle-power M.46 flash-bomb used to-day. A light as powerful as this allows of an exposure of 1/25th second. This shutter timing is obtained by making a slit travel across the film at a speed synchronised with the forward speed of the aircraft over the ground. So efficient is this arrangement that apertures as small as f/6.3 can be used. The flash lasts about one-tenth of a second, and it is possible, by the employment of photo-electric cells, to ensure that the photograph is taken at the peak of the light intensity.

Twelve flash-bombs can be stowed in the bomb bay of a Mosquito. The point is, however, that these night photographs, in conjunction with accurate navigation, cover an area sufficient to ensure that the specified target will be included in the picture. For many years the Americans used multi-lensed Fairchild T2 and T3 cameras, but a great deal of their war work has been done with the 5in. × 5in. K24, which is the U.S. version of the R.A.F.24 camera.

The Training Unit has three dual-control Mosquito VIs for the pilots to learn to handle their new craft. Seventy per cent. of the Mosquito crews have done 700 hours or more on Fortresses or Liberators before being posted to this much-sought-after assignment. The conversion course includes 5 hours' dual, and another 20 hours' solo flying are put in. Of the pilots who are posted for training, some four out of five make the grade, and the remainder are returned to the pool.



The wet and dry bulb thermometer mounting on the nose of one of the Fortresses used by the Heavy-Weather Squadron. The weather observer sits at a table facing the instrument.



An American Mosquito XVI of the Light-Weather Squadron, seen from under a Fortress of the Heavy-Weather Squadron. Both types are used, the Fortress over the Atlantic and the Mosquito wherever the enemy may be encountered or where high speed is desirable.

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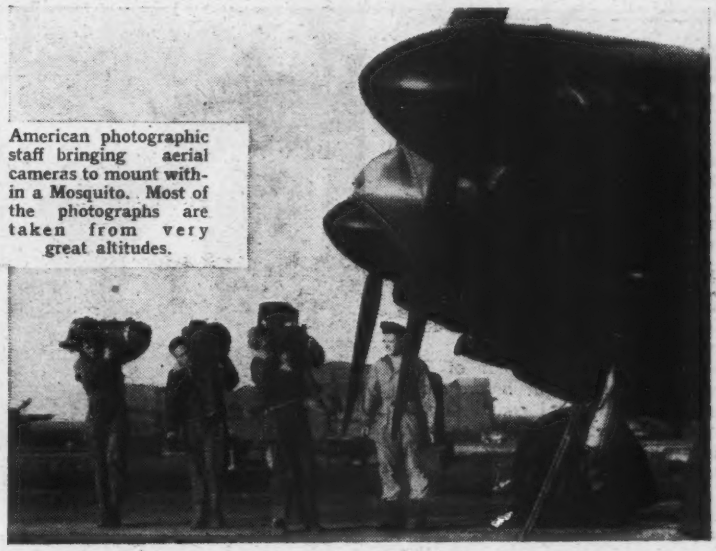
Great Skill Required

As I pointed out earlier in this article, the Americans are having some difficulty over their crews. Primarily the whole American air set-up is designed to work by day. For this work, however, the majority of the flying is in bad weather by night, and a different standard of pilotage and navigational skill is required. Most of all, there is a different temperament to be acquired. There is a vast difference between being one of a huge formation of tightly packed four-engined bombers, each with more than a dozen guns, and protected by a one-for-one fighter escort, in daylight over Germany, and being in a comparatively small aircraft, and flying in ten-tenths cloud at night to assess the icing conditions. That such a high percentage makes the grade is a great tribute to the basic training and natural aptitude of the U.S. aircrews.

Our own Mosquito XVI crews, flying at high altitudes, have all been attacked from behind or beneath recently by German jet-propelled aircraft when on daylight missions. So it is with the Americans. One such attack was experienced near Stuttgart by Lt. Kenny and his navigator, Lt. Kuehn. The Mosquito was "jumped" by an Me 262 at 30,000ft., and the fight went on all the way down to 12,000ft., at which altitude the Me had run out of ammunition and was leading a futile existence making dummy passes. The Me's guns appeared to be bigger than 20 mm. and the shells were fused to explode at a predetermined distance. No tracer was used, and there were no hits on the Mosquito. All the way down violent evasive action was kept up, and the pilot estimates that the Mosquito exceeded 700 m.p h. in the steepest dive. The Me jet fighter was able to keep up.



American photographic staff bringing aerial cameras to mount within a Mosquito. Most of the photographs are taken from very great altitudes.

A light load. Twelve 700 million candle-power photo flash bombs in the bomb-bay of a Mosquito.

Speed and Mach Number

The figure of 700 m.p.h. can scarcely be accurate, even for the superbly streamlined Mosquito. Supposing a terminal velocity somewhere in between 0.8 and 0.9 of the speed of sound—and this would be a very high figure—the limiting speed would be in the region of 610 m.p.h. at 15,000ft. Even at sea level, where the speed of sound is 764 m.p.h., the limit would still be below 630 m.p.h.

There is no end to the interest on this station. All the crews are keen to tell of some particular job done on a Mosquito. Another pilot told how his "ship" came home with 40 "shells" in the wings. This is likely to be misleading to the British reader because bullets are all shells to an American, and the term does not necessarily mean the 20 mm. explosive type. Another Americanism likely to be misunderstood in England is that plugs "blow out" instead of misfire.

Many of the pilots' reports speak of St. Elmo's fire on the aircraft when flying in cumulo-nimbus cloud. The crews derive a certain Mephistophelean enjoyment from making long sparks come from their finger ends to parts of the machine.

I accepted Maj. Ellis-Brown's invitation to go and have a look at the weather and things in Holland. We made the trip in M for Maypole. The engines, which were already warm, started immediately, and after the double doors of the pressure cabin had been closed by the jockey-capped mechanic, we taxied gently at 1,200 r.p.m. round the perimeter track to the take-off point. On the way the oxygen was connected and turned on and the airfield control told that we should be airborne for a little over 1 hr. 30 mins.

Because of possible overheating, the caravan at the end of the runway was requested to clear a Fortress which was in our way. With the Fort out of the way we were given the "green" and were airborne 24 sec. later, with 140 m.p.h. showing on the A.S.I.

Away on the port bow an ugly black column of smoke rose from just outside another airfield. A Fortress had just crashed and caught fire. Soon after take-off the pilot

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changed over to the long-range fuel tank in the bomb bay. Altogether some 750 gallons of fuel were carried.

We were in no hurry and climbed leisurely at 1,000ft. per min. with the Rolls-Royce Merlins doing 2,600 r.p.m. and 210 m.p.h. showing on the "clock." Strangely enough, as we flew over the sea and under an even layer of stratus cloud, we ran into small areas of turbulent air. In such conditions one would expect absolutely bump-free air.

Above was a formation of Fortresses getting height before crossing the Continental coast. Below was a blue-grey carpet of sea and haze which made a perfect camouflage background to the Mosquito. From quite a short distance away it would have been difficult to discern the outline of the aircraft, and the only discernible indication would have been the red outlined star and bar of the American markings. As we approached Holland, Maj. Ellis-Brown pointed away to the left, where a formation of American heavies was getting quite an amount of *flak*.

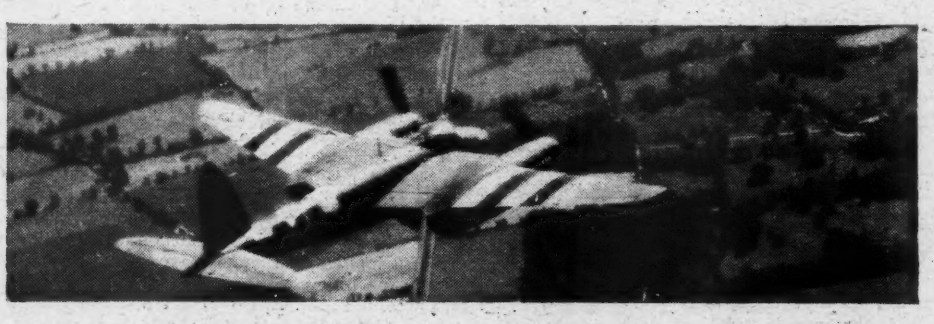
The unfamiliar jockey cap sported by American ground crews appears at the entrance. Note the double doors of the pressure cabin. The outer door opens downward and the inner door opens upward.

The journey at this point was not without interest for both of us when I compared the height at which I was flying with the 2,500ft. at which I flew over the same route in a Stirling to Arnhem. Maj. Ellis-Brown was also flying a Stirling when he was in the R.A.F. He went on some of the very early daylight raids, including the attack on the Potez aircraft factory at Meaulte. For him the particular interest in this trip was that he was very close to the part of the Dutch coast where, in 1941, he made three very determined attacks on an oil tanker and succeeded in sinking it. For this he was awarded the D.F.C. He was most generous in his memories of the Stirling. How sturdy it was and how throwable-about! The outward journey over, we turned for base; the pilot asking for a bearing over the V.H.F.

How gently the Mosquito seems to fly. It never throbs or drums or seems "busy." As we returned through the 11,000ft. level, our true ground speed was not far short of 400 m.p.h., yet a bus doing 20 m.p.h. would make more fuss about it.

Over the coast and down to 1,000ft. Fuel pump off, oxygen off, wheels down, flaps down and a perfect landing.

An interesting trip.



FLYING BOATS FREED FROM ICE

SUNDERLAND and Catalina flying boats of R.A.F. Coastal Command which, a few days ago, were frozen in their base in Northern Ireland are again hunting for U-boats in the Atlantic.

When the sea froze over for the first time in fifty years there was ice four or five inches thick, and the temperature fell to 24 degrees below freezing point.

Working day and night for five days in bitter cold and blinding snowstorms, the airmen of the Marine Craft Section hauled as many flying boats as possible on to the shore and broke the ice round the mooring areas of the remaining aircraft.

"Five floating refuellers patrolled for twenty-four hours breaking the ice," said Sqn. Ldr. A. T. B. Cooper, of Ellerby Lodge, Hinderwell, Saltburn, Yorks., who is in charge of the Marine Craft Section—the biggest ever assembled in a lough. "They used bomb scows to clear a space round the aircraft and dragged the ice blocks to the land. They did a grand job."

M. OF S. EXHIBITION

THE Ministry of Supply (Directorate of Public Relations) gave a private exhibition in Manchester recently, extolling the part played by technicians in the current air offensive. The exhibits were well displayed and rich in detail.

The foremost exhibits were a section of a Rolls-Royce "22" Merlin engine and a hydraulically operated gun turret. Of exceptional interest was the device for viewing stereoscopic air photographs.

Three films were shown: a news item, a documentary called the "Sky Giant" depicting the production and use of the Lancaster bomber, and a film showing the production of aircraft engines at a Rolls-Royce factory, emphasising the scrupulous care paid to detail, and the accuracy and quality.

Hardly anything connected with the equipment of a modern bomber was left out of the exhibition, which, among other things, included an inflated rescue dinghy, complete with fishing tackle and instruction booklet (how to land a turtle!).

Endeavour 1945

H.R.H. the Duke of Gloucester's Personal York : Name Link with Captain Cook's Ship

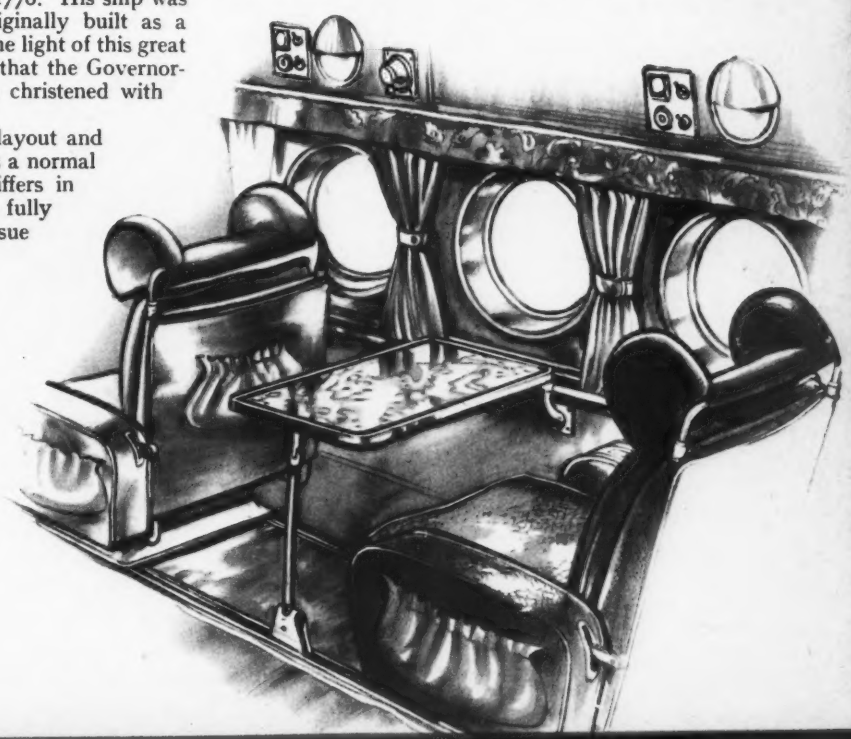
TO A. V. Roe, Ltd., has fallen the privilege of supplying a personal aircraft to H.R.H. the Duke of Gloucester for use in his appointment as Governor-General of Australia. No one can conceivably be in doubt as to the value of an aircraft for facilitating the Governor-General's travels about the huge tracts of the Commonwealth ; and it is a sign of the times that His Royal Highness should have chosen an aircraft. But a few years ago it would have been a special train.

Captain James Cook first hoisted the Union Jack on Australian soil, so taking possession of the continent in the name of the crown, in the year 1770. His ship was a small 370-ton, 22-gun vessel, originally built as a collier, and named *Endeavour*. In the light of this great precedent it is indeed an apt choice that the Governor-General's aircraft should have been christened with the same name.

With the exception of its interior layout and one or two refinements, *Endeavour* is a normal standard York and, structurally, differs in no way from the ordinary aircraft as fully described in the August 17th, 1944, issue of *Flight*.

Externally, the immediately noticeable difference is that *Endeavour* is uncamouflaged and instead presents a gleaming, highly polished natural surface on which the Service roundels are blazoned with all the splendour of heraldry. This note is further emphasised by the golden and crimson device of a Governor-General which is carried on a field of royal blue on each side of the pilots' cockpit.

A refinement which is also external and which will follow on subsequent Yorks is that elevators and ailerons are metal-covered instead of the fabric-covered type which has so far been used. However, the central tail fin on *Endeavour* is a fabric-covered unit in conformity with normal York practice. The natural polished finish of the aircraft has even been extended to the airscrew blades and spinners, but a disadvantage of such a finish is that at close quarters and in a certain light undue emphasis is given to inequalities in the skin



One of the removable tables on the starboard side. The single leg clips into the seat runners and on the other end hooks fit over a rail running the length of the cabin wall.

INTERIO

The Governor-General's stateroom. Curtains hang on each side of the gangway. Ventilation and oxygen points are by the portholes.

surface, and various parts of the machine may then look as though their covering is made from beaten-out biscuit tins. Again, the de-icing shoes on wing and tail surface leading edges are over-emphasised; these, of course, are purely æsthetic aspects and could arguably be said to be unimportant, and yet one cannot help feeling that the aircraft, in view of its intended purpose, should be above reproach in all aspects.

The interior layout has been very well done and should prove eminently suitable for its job; but there are sundry points about it which suggest that not quite as much forethought has been given to it as the subject warrants. These points are concerned with detail and not specifically with layout as such; nevertheless, detail cannot be disregarded without penalty.

Cockpit structure and layout generally is standard, as is the equipment, but an unusual feature is the provision of large electrically driven windscreen wipers which, in conjunction with the normal de-icing sprays, should effectively take care of forward vision in almost all weather conditions.

Crew's Quarters

Immediately behind the navigator and radio-operator are fitted comfortable adjustable seats, the starboard being for the flight engineer and the port for any member of the crew who is off duty. Fuel gauges and temperature and pressure gauges are placed at the flight engineer's station, although fuel transfer valves and all engine and ancillary services' instruments are arranged as part of the normal equipment in the cockpit proper. Above the rest-seat is fitted a shelf carrying the ordinary radio receiving set which serves the various seats and berths throughout the aircraft.

Behind the F.E.'s and rest-seats are cupboards with racks upon which can be stowed the light personal luggage of the crew, and aft of these are toilet rooms to port and starboard. Each toilet is fitted with a light-alloy folding wash basin mounted on the forward bulkhead and a special Elsan flushing closet. Colour scheme is white high-gloss paint with black-and-white-squared linoleum on the floor.

Access is given aft through a door into the forward stateroom. This is a compartment containing upper and lower berths, the latter of which are upholstered and so arranged that they may be used as settees during the day. Additionally, a folding table can be fitted between the settees so that the compartment can be used as a dining-room if so desired. The upper berths are framed with chromium-plated light-alloy tube to which are pinned longitudinal spring-steel ribbons for the mattress foundation, and tubular-frame lee-boards are hinged to the inboard frame-members. When not in use the upper berths, which are hinged along their outboard length, can be swung upwards to an angle of about 45 deg. and, as they are covered with a valance curtain, they give a type of marquise ceiling effect. There seems little reason, however, why these upper berths could not have been arranged to stow almost vertically against the wall and so place no restriction upon the impression of the compartment's spaciousness. Curtains and upholstery are of an old-rose heavy fabric with a small, dull gold pattern. Ceilings and walls are covered with light buff leather with maroon leather piping and an old-rose carpet covers the floor.

Berth Services

Reading lights are fitted to the forward bulkheads over each berth, and steward call-buttons and radio plug-sockets and switches are likewise provided. Individual fittings for regulating and directing a supply of cool air are provided as on standard Yorks, and each compartment is similarly supplied with warm air from grilles in the cover skirting. A nice point of design is the way in which the oxygen supply pipes at each berth are arranged to pass from the outboard wall, under the berth and so up to the sleeper, thus precluding any possibility of broken pipe joints or restricted flow due to carrying the tubes over the bedclothes.

The rear door of the compartment gives access to the entrance "hall" and galley, the latter being to starboard and separated from the entry space by a fore-and-aft partition in which is a sliding door. A stainless steel sink and draining board is fitted against the starboard wall, there being cupboards fitted beneath, whilst against the forward bulkhead is the refrigerator with a cupboard above it. Over the sink is an immersion-heater urn for boiling water, and on the after bulkhead is a water filter, china cupboards and racks, and also a fire extinguisher. A folding seat is provided for the steward against the after bulkhead beneath the china and cutlery cupboards. Hot and cold water for all points is supplied from appropriate tanks in the roof of the centre section, the h.w. tank having an immersion heater. An electric cooker is also incorporated so that hot meals can be prepared, and the galley is finished in a high-gloss white paint and has a linoleum-covered floor.

In the rear port corner of the entrance "hall" is a wardrobe space, access to which is obtained from the

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main saloon which occupies the rear central volume of the fuselage. Entry to the saloon is through a swinging door which, like almost all the other doors in the aircraft, is flush-panelled with polished walnut veneer. The hall space is finished in light buff leather with an old-rose carpet.

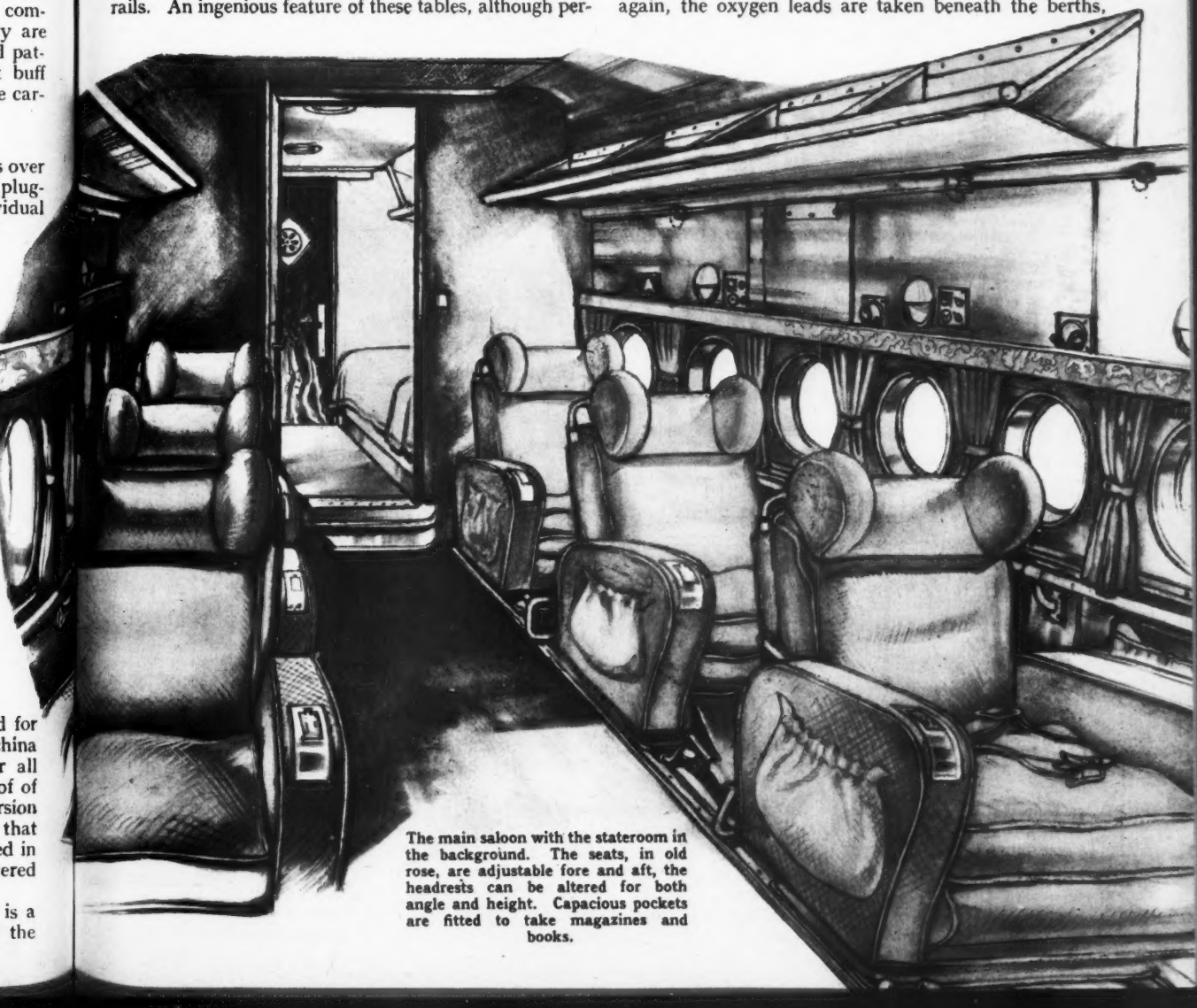
Main Saloon

For the main saloon the colour motif and materials are identical with those in the forward stateroom. Eight individual chairs are fitted, four per side. These are of Rumbold design and manufacture, although the covering, in common with the whole design and production of the aircraft, is the work of A. V. Roe. Each chair has a back rest which can be raked through about 20 deg. and is fitted with extensible footrests and leg-supporting sheets so that, if necessary, one can go to sleep in one's chair almost as comfortably as in bed. Additionally, the chairs have winged head-rests, adjustable for height, and can be pivoted round through 180 deg. to facilitate conversation or allow of playing cards.

Beneath the circular windows runs a rail on to which walnut veneered tables can be clipped, their inboard ends being supported by a single leg engaging in floor rails. An ingenious feature of these tables, although perhaps a trifle elaborate, is that they are pivoted laterally across their centres so that they may be adjusted level irrespective of the aircraft's attitude in pitch. At each seat station are oxygen points, individual lights, radio plug-sockets and switch, steward's call-buttons, and in addition the normal cold-air supply fitting standard upon the York. Ample luggage space for light personal effects is provided upon racks at cornice level.

Certain minor points appear open to criticism. For instance, the absence of light thin sunblinds for the windows (for at height, even in this country, the sunlight can be almost blinding in intensity). The use of headphones for anyone wishing to listen to the radio strikes one as being a mistake, for, as is known, the wearing of headphones can be very uncomfortable. The incorporation of miniature loudspeakers in the chair head-rest wings would appear to be preferable.

Aft of the main saloon is the Royal stateroom which is furnished simply and functionally. The berths run the full length of the apartment; that is, about 6ft. 6in., and are provided with full-length curtains suspended from the luggage racks so that sleeping privacy may be maintained despite the passage of anyone through the apartment if such is rendered necessary. Here, again, the oxygen leads are taken beneath the berths,



The main saloon with the stateroom in the background. The seats, in old rose, are adjustable fore and aft, the headrests can be altered for both angle and height. Capacious pockets are fitted to take magazines and books.

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and each is provided with service fittings similar to those described for the forward stateroom. The colour scheme is pale blue for the leather-covered walls, with a darker blue carpet and curtains. A point which has apparently been overlooked is that the berths are parallel to the floor, and when the aircraft is flying normally they will be inclined, head down, at about 7 deg. to the horizontal.

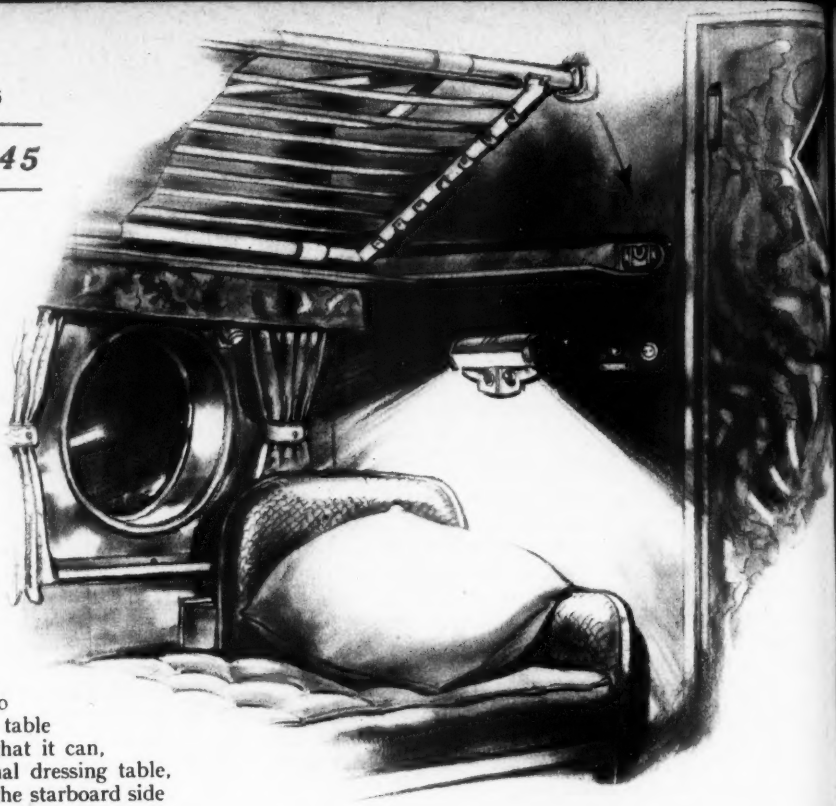
Adjoining the Royal stateroom aft is a private toilet, incorporating a stainless-steel lavatory basin to port with cupboards under, and a special closet similar to those fitted forward. A folding table is hinged to the after door so that it can, if necessary, act as an occasional dressing table, and a wardrobe is recessed into the starboard side of the after bulkhead.

Rearward, the fuselage is standard and comprises a stowage compartment for luggage, dinghy and portable oxygen bottles, and, in the extreme tail, the compartment housing the D.R. master compass, a crate of the main oxygen supply bottles, the de-icing fluid reservoir, and stowages for ground equipment.

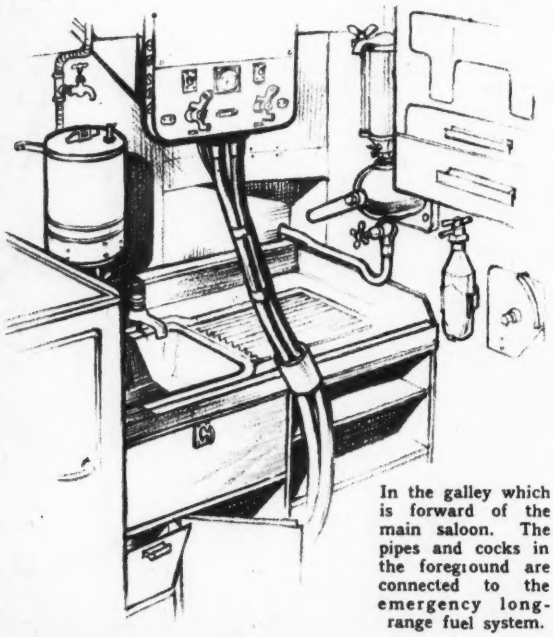
Long-range Tanks

For the flight out to Australia *Endeavour* is having her entrance hall almost completely filled by a 624-gallon fuel tank which, in addition to the normal tankage, should allow the journey to be made in about three hops.

Endeavour's crew are all members of the Royal Australian Air Force, and none is more than 30 years of age. The captain is Wing Cdr. D. R. Donaldson, of Brighton, Victoria, who is 30, and enlisted in the R.A.A.F. in September, 1940. He was trained in Australia, and came to this country in May, 1941. In addition to having been at one time a staff instructor on Wellington IIIs over here, was also C.O. of an Australian Lancaster squadron of Bomber Command.



A corner of the forward stateroom. The upper bed hinges down and is shown (partially stripped) in the day position. A plug for radio is by the wall lamp.



In the galley which is forward of the main saloon. The pipes and cocks in the foreground are connected to the emergency long-range fuel system.

Co-pilot and Crew

Co-pilot is Flt. Lt. R. R. Anderson, of Double Bay, N.S.W., who is nearly 28 years old, and arrived in England in April, 1943, since when he also has served with an R.A.A.F. Lancaster squadron. The navigator is F/O. J. G. Earl, of Eastwood, N.S.W., who did some of his operational flying with Wing Cdr. Donaldson. Earl, who is 25, was trained in Canada, and arrived over here in March, 1943. F/O. K. W. Miller, of Brisbane, Queensland, is *Endeavour's* flight engineer. He served as a fitter on R.A.F. stations in Britain before remustering to aircrew. He is aged 26, and has been away from Australia nearly four years. The radio operator is P/O. L. E. Welldon, of East Brisbane, Queensland. He also has flown together with Wing Cdr. Donaldson and F/O. Earl on a number of operational sorties. Welldon enlisted in the R.A.A.F. in January, 1942, was trained in Australia, and arrived over here in March, 1943. He is 26.

When *Endeavour* makes her flight out to the Commonwealth her co-pilot will be Ft. Lt. J. A. Critchley, D.F.C., of Brighton, Victoria. Critchley was captain, for the last three sorties over Germany, of the veteran R.A.F. Lancaster, *G. for George*, which was flown to Australia for exhibition in the Commonwealth War Museum.

Everyone will wish to express sincere good wishes to H.R.H. the Duke of Gloucester in his Governor-Generalship, and may his *Endeavour* have equally as gallant a history as its famous namesake.

CIVIL AVIATION

A Scottish Plan

REGIONAL ORGANISATION OF AIR TRANSPORT. A PLEA FOR PRESTWICK

THE Scottish regional plan for commercial aviation which is now engaging the attention of all Scottish planning agencies and local authorities, and for which the vigorous support of all Scottish Members of Parliament has been pledged, is described in a survey published under the title "North Atlantic."

The project is not concerned merely with airports. It proposes the enlargement of British commercial aviation by the creation of operating organisations on a regional basis, and advocates:—

(1) Overseas and internal airlines based on Prestwick and operated by a company native to Scotland.

(2) The development of Prestwick Airport as first alternative to Heathrow, the London terminal, and as a junction for the various services through the northern hemisphere operated by Britain and other nations.

(3) The creation of a commercial aircraft manufacturing industry affiliated for design experience to the Prestwick commercial airlines.

In order to seize the opportunities of the next ten years which Britain has by virtue of being the centre of a hemisphere containing more than 90 per cent. of the world's population, more than 90 per cent. of the world's industrial activity, and therefore more than 90 per cent. of potential air traffic, the survey says that Britain must revise its judgment on the following points:—

"The first concerns costs. Prior to 1939 overseas air transport lived on subsidy and political protection. It will not be so when this war ends. It is stating only half the truth to say that air transport costs are diminishing or that they have reached an economic level. At the present stage it is possible to offer passenger fares below the cost of first-class rail and shipping fares. Within five years of the war's end air rates will be comparable with third-class surface fares. Within ten years they may have dropped below them.

"The second concerns the nature of commercial air transport operations. Before the war British overseas air services were designed principally to supplement Commonwealth communications. Therefore the old Imperial Airways routes ran mainly to the south and south-east through territories that were primitive in their economy. The routes of prime importance to commercial operators are nearly all in the northern hemisphere, for commercial airlines have to seek traffic in volume. In other words, their object must be to provide service to the greatest possible number of people, leaving the question of Commonwealth communications to the Government or the instrument which the Government created.

The third point concerns Britain's place in the scheme of things. "British air transport will flourish only so long as freedom of the air means freedom to apply the energy, experience and imagination of aviation companies, in aviation for aviation's sake."

Against the "Chosen Instrument"

"Already there is visible the greatest of all the disadvantages of the 'single chosen instrument' policy—the survey says—that is the monopoly of operation experience granted to British Overseas Airways and resulting in a dearth of potential airline operators in Great Britain. The applicants for comprehensive rights on foreign and domestic routes consist not of aviation companies ready and willing to face world competition on any terms, but of shipowners and the railway companies, plus one out-and-out aviation company based on Prestwick. It is too late to attempt the segregation of transport industries on the American plan, so that British commercial aviation might grow to full stature under the most favourable conditions But practical means are at hand to ensure that in one area, at least, commercial air transport will be subject to the leadership and standards set by operators concerned only with aviation and who can therefore be trusted to develop air transport interests without regard for other considerations."

Coming down to earth, the survey says that Prestwick, with its unexampled weather record, is the ideal base for a regional airline plan to be integrated within a general British one.

Prestwick—it is said—has been for four years all that London hopes to make of Heathrow and New York of Idlewild. It is also capable of infinite expansion as a base for flying boats, no matter what size, for its seaway is the Firth of Clyde.

Incidentally, early in 1943 the present Board of Scottish Aviation gave notice of intention to transfer to communal ownership their holding in the airport, either by conversion of the airport undertaking to a public utility corporation or as the Government might advise. This transfer, the survey states, awaits the conclusion of present negotiations between Scottish M.P.s, the Secretary for Scotland, the Minister of Civil Aviation and the Secretary of State for Air.

The airline plan based on Prestwick and advocated by the survey consists of:—

(1) Night Service to and from New York for sleeper passengers and first-class mail and freight.

One stop will be made at Goose Bay (Labrador) or Gander (Newfoundland) or other alternative airports. Aircraft will each have sleeping accommodation for twenty passengers and will carry 2,200 lb. of mail and freight. Passengers leaving Prestwick at 10 p.m. will reach New York in time for breakfast.

(2) Day Service to and from Canada and the United States (via Iceland and Goose Bay) for passengers and second-class mail and freight. Direct connection between Prestwick and the European airline services at Paris, Amsterdam, Hamburg, Oslo and Stockholm.

A Global Service

The day service on the Northern route provides for three stops *en route* at Iceland, Greenland and Goose Bay or Gander. It will connect with the Canadian and U.S. internal airline networks, thus facilitating rapid transit to any destination in North America. Aircraft will each accommodate 40 passengers in addition to 6,000 lb. of mail and cargo. The relatively short stages on this route make it possible to offer attractive rates for many varieties of freight, and in respect of all Atlantic services Scottish Aviation have offered to undertake postal contracts without subsidy.

The Continental shuttles are to connect with the airline services of Europe at Paris, Amsterdam, Hamburg, Oslo, and Stockholm. They will consist of 20-seat passenger aircraft and a fleet of aerial freighters. In this case also provision will be made from the beginning for the handling of traffic in volume and at rates likely to attract exporters and importers.

A global route will be projected around the Northern hemisphere as equipment becomes available and operational experience is obtained on the Atlantic services. It will consist of a main line serving Oslo, Stockholm, Leningrad, Moscow, Omsk, Pekin, Vladivostok, Fairbanks (Alaska), Vancouver and Chicago, and two Southern loops joining the main line at Vladivostok. The loops provide services for (a) Hamburg, Berlin, Odessa, Baku, Teheran, Karachi, and (b) Amsterdam, Vienna, Belgrade, Istanbul, Cairo, Karachi, Calcutta, Hong Kong (with, ultimately, a shuttle to Tokio), Pekin and Vladivostok.

The Atlantic, European and internal services will be the first to be established after Government sanction has been obtained.

Scottish Aviation have satisfied themselves that attractive fares can be offered without subsidy. Initial fare tables provide for service to New York for £80 return.

For the purposes of Scottish planning, conversion of American aircraft to passenger requirement has been chosen "as the most timely, effective, and economic means of getting air commerce into the air and of ensuring the continuity of Scottish aircraft manufacture." The survey admits that there are objections to such a course, but it says that there is no alternative, as "British aviation industry is largely without experience in the design and manufacture of commercial air carriers; the preliminary work required for getting out commercial types will occupy many months, possibly one or

(*Continued at foot of next page*)

CIVIL AVIATION NEWS

AIRMINDED

PORTSMOUTH City Council have agreed that its finance committee should report on a suggestion that the corporation should offer land and foreshore rights for the construction of a Government-sponsored international airport on Langston Harbour.

COLONIAL AIR LINKS

LORD SWINTON, Minister of Civil Aviation and former Resident Minister in West Africa, told the Royal Empire Society that we must hold on to the up-to-date communications which war has brought to West Africa.

"Air communications to this country, within and from the colonies," he said, "are going to be of the greatest value; it may be that they will be the greatest contribution to colonial planning."

SCANDINAVIAN TYPE

A NEW aircraft for the private owner has been developed by the Swedish aircraft industry. It is a single seater constructed in wood with a wing span of 22.4ft. and a streamlined 19ft. long fuselage.

Powered with a 60 h.p. engine, it has a cruising speed of 125 m.p.h. and a range of 1,060 miles, which is probably more than any other type in this class. Ceiling is 24,600ft.

The diving speed, stated as 370 m.p.h., appears to be extraordinarily high for an aircraft of this type and construction, and it is for this reason that it is likely to be used for advanced training of fighter pilots. The aircraft is said to have shown very good flying and manœuvring qualities during its test flights and has been approved by the Swedish Air authorities.

IN PARLIAMENT

WHAT His Majesty's Government has done to conclude reciprocal air transport agreements to further British post-war civil aviation and with which States negotiations are on foot was a question asked in the House by Mr. A. Edwards.

In reply the Parliamentary Secretary to the Ministry of Aircraft Production, Mr. Lennox-Boyd, representing the Minister of Civil Aviation, said that "His Majesty's Government have signed the International Air Services Agreement, which provides as between the signatories the right of transit over territory and the right of making non-traffic stops, and the Interim Agreement for the establishment of the Provisional International Civil Aviation Organisation.

"The Government are in constant touch with other British Commonwealth countries," he added, "and agreement has been reached for the operation of Commonwealth Air Services, subject to the exigencies of the war. With a number of foreign Governments they are discussing plans for co-operation.

BLAIR

BRITISH LATIN AMERICAN AIR LINES, LTD., which combine the interests of the Royal Mail Lines, the Blue Star Line, the Pacific Steam Navigation Co., and Lamport and Holt, Ltd., have an ambitious programme for their post-war operations.

They propose to operate a service to Buenos Aires via Lisbon, Bathurst, Natal, Rio, Montevideo, a total of some 7,152 statute miles, in flights of about 2½ days' duration. The service is to be co-ordinated with U.K. internal services so that passengers from all parts of the country could fly from their home towns to Rio or Buenos Aires, and the home terminal is to be somewhere in the South of England.

Within six months of obtaining Government permission the route could be operated with one service a week, to be increased to three services weekly.

It is refreshing to note that no enticing fares are being blared by the B.L.A.I.R.; ignoring the fashion of announcing meaningless if impressive low rates, the company predicts that at the outset their passengers fares will be somewhat higher than the sea rates.

The chairman of the company is Mr. John W. Booth, J.P., and other directors are Messrs. C. C. Baker, S. W. Black, W. H. Davies, L. Davies, and F. H. Lowe.

PLANNING IN FRANCE

FRANCE is to hold a National Aviation Congress from April 3rd to April 8th under the auspices of the French Ministry for Air.

Scientists, industrialists, pilots and other French experts will take part in a series of meetings which it is expected will lay the basis of the future of the French aviation industry. A number of the sessions will be secret.

One of the problems is the production of new aircraft type. During the occupation French factories were turning out German designs only.

LOOKING EASTWARDS

AMERICAN airlines planning their post-war services contemplate new routes linking India and China with the U.S.A.

Nine airlines have filed their applications with the Civil Aeronautics Board, at present in session, for routes in the Pacific area. Five want routes connecting with India, China and Japan, and four along the west coast of America to Alaska. Pan-American Airways seeks a great circle extension of its pre-war routes to China and New Zealand by way of the Hawaiian Islands. It also asks approval for a link from the former terminus at Hong-Kong direct to Calcutta through the facilities of National Airways, and from its former terminus at Auckland, New Zealand, to Sydney, Australia.

Hearings of the Board will continue for the next two weeks.—*Reuter*. MF 0608.

U.S. ACCEPT

THE U.S. Government has taken steps to accept the Interim Agreement on International Civil Aviation, the International Air Services Transit Agreement and the International Air Transport Agreement signed at the International Civil Aviation Conference at Chicago on December 7th, 1944. The Convention on International Civil Aviation will in due course be submitted to the U.S. Senate for its advice and consent.

These acceptances by the Government of the U.S., however, are given with the understanding "that the provisions of Article II, Section 2, of the International Air Services Transit Agreement and the provisions of Article IV, Section 3, of the International Air Transport Agreement shall become operative as to the U.S. of America at such time as the Convention on International Civil Aviation, signed at the International Civil Aviation Conference, shall be ratified by the U.S. of America; and that the provisions of the second paragraph of Article V of the Interim Agreement on International Civil Aviation are, in respect of the U.S. of America, subject to the requirements of its constitutional processes."

The articles to which this special reference is made read as follows:—

International Air Services Transit Agreement, Article II, Section 2: If any disagreement between two or more contracting States relating to the interpretation or application of this agreement cannot be settled by negotiation, the provisions of chapter 18 of the above-mentioned Convention shall be applicable in the same manner as provided therein with reference to any disagreement relating to the interpretation or application of the above-mentioned Convention.

International Air Transport Agreement, Article IV, Section 3, is identical.

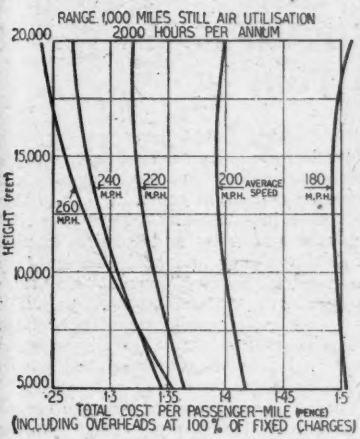
Interim Agreement on International Civil Aviation, Article V, second paragraph: The expenses of the organisation shall be borne by the Member States in proportions to be decided by the assembly. Funds shall be advanced by each Member State to cover the initial expenses of the organisation.

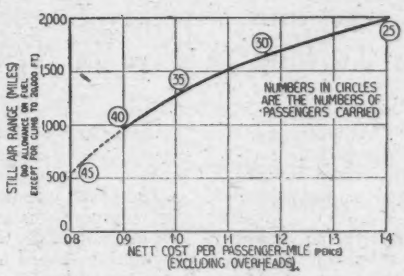
A SCOTTISH PLAN (Continued from previous page)

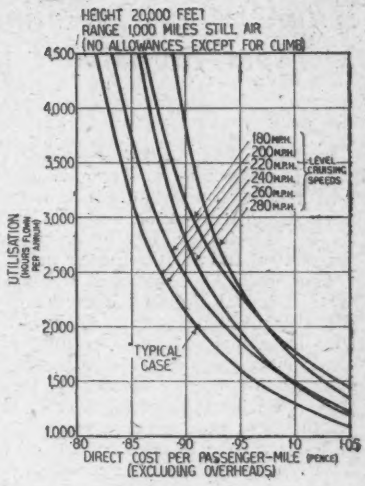
two years, and there is little likelihood of modifications of existing British bomber designs being able to compete against foreign airlines without subsidy. The structural weight of aircraft designed to withstand heavy enemy *flak* would be too high."

Of aircraft manufacture the survey states that even at this late date it may require the exercise of some good Scots fundamental common sense, or its equivalent, to see that it is the experience of the commercial airline operator which will produce the specifications for British-built commercial aircraft, and that prudence demands a division of aircraft manufacture between North and South.

Aircraft Operating Costs







(Left) Total cost per passenger-mile plotted against average speed and height. (Above) Net cost per passenger-mile v. still-air range. (Right) Direct cost per passenger-mile v. utilisation (40 passengers).

Hours of Utilisation Multiplied by Speed is the Potent Factor in Air Transport Economy

SOME time ago, at the annual general meeting, the chairman of Airspeed, Ltd., Mr. A. S. Butler, referred to the new civil Airspeed machine which his firm will build as soon as conditions permit. He did not mention the type number but, as we pointed out at the time, it will be known as the A.S.57. Details of the machine may not be published at present, but the firm has made some very interesting estimates of operating costs, which appear to indicate that the A.S.57 will be an extremely efficient aircraft. Moreover, the calculations point to the fact that, contrary to general opinion, a high cruising speed *can* be combined with economy in operation.

The new machine can obviously be employed in various ways and with various proportions of payload and range. Taking as a typical case the full complement of 40 passengers, a flight crew of three and one steward, with a still-air range of 1,000 miles at a cruising speed of 240 m.p.h. at 20,000ft., and assuming a utilisation (i.e., number of hours flown per annum) of 2,000, the direct operating cost per aircraft per hour works out at £34 14s.

A Typical Case

The manner of arriving at this cost (it does not include overheads, since these will vary greatly on different routes) is as follows:—

Item of Cost	Cost per aircraft-hour for the "Typical Case."
Fuel and oil. Assumed cost of fuel = 2s. per U.K. gallon. Assumed cost of oil = 6 per cent. of fuel cost. An allowance must be added to the level cruising fuel consumption to cover take-off and climb. The extent of the increase will vary with the range and the route operated, but for this "Typical Case" a value of 20 per cent. has been assumed.	
Fuel and oil/hour at average of 1.2 × 57 gallons/hour/engine = £0.1 × 2 × 57 × 1.2 × 1.06.....	£14.50
Airframe maintenance. Assumed cost/hour = £1.5 per 10,000 lb. of airframe weight (i.e., tare weight-power plant weight).	
Airframe maintenance/hour = £1.5 × 2.04	£3 06
Engine maintenance. Assumed cost/hour = £1.5 per 1,000 cruising b.h.p.	
Engine maintenance/hour = £1.4 × 0.90 × 2	£2.70
Flight crew. Assumed that personnel fly for 850 hours/annum. Assumed annual salaries of captain £1,200, 1st officer £750, radio operator £600. Assumed annual cost of insurance and other expenses of flight crew = 15 per cent. of annual salary.	
Flight crew/hour = £2,935/850	£3.45
Passenger service. This is intended to allow for passenger liability insurance; pay of stewards and costs of linen, etc., in the aircraft. It does not include the cost of food or drinks in the aircraft. Assumed cost per passenger seat/hour £0.05.	
Passenger service/hour = £0.05 × 40	£2.0
Airframe depreciation. The cost of maintaining the airframe in a fully airworthy state throughout its life is shown under Airframe Maintenance. The depreciation is, therefore, mainly obsolescence due to advances made in design and construction with the passage of time. Depreciation is here assumed to amount to three-quarters of the first cost of the airframe, spread over a period of five years. The remaining quarter represents the residual value of the airframe. The airframe first cost is assumed, for the purpose of these calculations, to be £2.25 per lb. weight of airframe. (N.B.—Actual purchase price will depend on conditions at the time of purchase.)	
Airframe depreciation/hour = $\frac{£2.25 \times 20,400 \times 3}{5 \times 2,000 \times 4}$ ..	£3.45
Engine depreciation. Assumed that both engines are replaced after 5,000 hours, have no residual value and cost £2 per take-off b.h.p. (N.B.—Actual purchase price will depend on conditions at the time of purchase.)	
Engine depreciation/hour = £2 × 2 × 2,580/5,000, ..	£2.09
Insurance. Assumed rate 8 per cent. per annum on the average value (say, 80 per cent. of the first cost) of the aircraft. This is intended to cover damage to the aircraft or to any third party. First cost of aircraft £48,500 + £10,300 = £58,800.	
Insurance/hour = $\frac{£47,000 \times 0.08}{2,000}$	£1.88
Interest on investment. Assumed at 3 per cent. per annum on the first cost of the aircraft.	
Interest/hour = $\frac{£58,800 \times .03}{2,000}$	£0.88
Total direct operating cost per aircraft per hour ..	£34.14

The machine cruises on only 37 per cent. of its take-off power, so that there is an ample reserve to fight head winds without exceeding 50 per cent. of take-off power. In the cost estimate, account has been taken of the time occupied in climb and descent, and the average speed has been assumed to be 225 m.p.h.

Operating costs are, of course, influenced by several variables. Some of these influences are shown in the small graphs at the top of the page.

Turbines or Piston Engines?

Future of Reciprocating Engines : 6,000 h.p. the Likely Limit : H and X Types Preferred : Large and Possibly Small Piston Engine Ousted by Gas Turbine in Five or Ten Years

"NOW we are about to see a change in the type of power unit, and one which will influence aviation much as the advent of the steam turbine revolutionised ship propulsion and the size of power stations." . . . "Whittle can rightly be regarded as the 'Charles Parsons' of the aviation power unit."

Thus spoke Air Comdre. F. R. Banks in the paper which he read to the Royal Aeronautical Society last Tuesday. The title of the paper was "The Importance of Power Unit Development," and the author was well entitled to speak on that subject as he is Director of Engine Development at the Ministry of Aircraft Production, where he is responsible for the development of all piston engines and gas turbines, airscrews and engine accessories. Previously he was with the Ethyl Export Corporation, where he was directly responsible for the technical development of leaded fuels.

Air Comdre. Banks began by outlining some of the great developments in piston-engine power units during the last 25 years: the sleeve valve, the sodium-cooled poppet valve, lead-bronze and silver-lead bearings, variable-pitch and constant-speed airscrews, the supercharger, fuels of high anti-knock value, and better lubricants. These, plus better materials and long experience, had combined to give us engines of high output for low weight and moderate cylinder capacity. One engine, for example, had doubled its maximum power in eight years, from 31 to 63 b.h.p. per litre, and from 3.1 to 6.2 b.h.p. per sq. in. of piston area.

A high rate of development was essential in the aircraft engine field. Experience had shown that an engine took some four to five years from the drawing board stage to the production stage. He thought more appreciation should be shown of the efforts of the engine manufacturer, who often had his achievements wasted by inattention to detail airframe design. The high speeds now being asked for practically thrust upon the aircraft designer the need for clean design.

Speaking of engines of the future Air Comdre. Banks said that he doubted that we should see the reciprocating engine in unit sizes above 6,000 b.p.h., chiefly because of problems of installation and airscrews. Also, aircraft people preferred four engines, or more in large aircraft.

Type Considerations

As to what form the future engine will take, Air Comdre. Banks thought there was little difference in installed weight between the air-cooled and liquid-cooled types, power for power, and both poppet and sleeve valves worked satisfactorily. The poppet made for a somewhat lighter engine, the sleeve for a neater arrangement and better geometrical layout, and it was not materially affected by lead. He favoured the in-line engine, whether air-cooled or liquid-cooled. In high powers it was necessary to cram in as large a piston area as possible, and this could only be done by arranging the cylinders in H form with two crankshafts, or in radial form, either as an X or as a multi-cylinder radial. For an air-cooled he thought the best arrangement was the 24-cyl., 90 deg. X type, with four banks of cylinders in line. For powers above 3,000 b.h.p. with air cooling the sleeve valve might make possible an increase in bore above 6in.

In the liquid-cooled class the classic 12-cyl. 60 deg. vee was the best up to 2,500-3,000 h.p. From 3,000 b.h.p. upwards some other cylinder arrangement was necessary. The decision rested between the X and H arrangements. He thought the narrow X, lying on its side, with 60 deg. or less between adjacent banks, might have possibilities. Radiator and oil-cooler technique had been crude, and he would like to see some unconventional and bright ideas from the engine people on coolers in general.

The vexed question of engines specially designed for civil air transport was examined next by Air Comdre. Banks. He did not agree with that policy and held that military engines developed to give high take-off power would cruise continuously at 35-40 per cent. of this power. A period of 1,000 hours between overhauls would be achieved in another year or so, in the meantime a period of 700 hours represented only the difference between four and three overhauls in a year. What was required was complete reliability during the running period, not only of the engine but of such proprietary accessories as plugs and airscrews. As to fuel economy, he hoped the final development of the piston engine would give a specific consumption of 0.40 or perhaps even 0.38 lb. per h p. per hour. That might be in about five years' time.

Air Comdre. Banks devoted a good deal of time to the subject of fuel and reviewed the grades of fuel, the methods of anti-knock fuel grading methods. He stressed the vital importance of even distribution to the cylinders. While discussing safety fuels he pointed out that direct injection should help to reduce fire risk.

Engine Prophecy

The latter part of the paper was devoted to a survey of the gas turbine. Air Comdre. Banks began it with the following words: *"The gas turbine has not only come to stay, but it is bound to take the place of the piston engine for many applications. It will, in my opinion, be so competitive in five or ten years' time that the large piston engine may not survive, and the smaller piston engine will have a hard time to exist, also."*

Air Comdre. Banks then gave his reasons for this, to many, somewhat optimistic belief. We quote them verbatim:—

The principal disadvantage of the gas turbine is its high fuel consumption. For this reason alone the piston engine will remain in the picture for some time and until we know more about the operating economy of the gas turbine and the particular design of aircraft required for it.

But one great advantage of the gas turbine is the speed at which it can be evolved. It takes about one-third of the time to design and build a prototype turbine of the simple "jet" type, compared with a piston engine of comparable power. Even the more complex turbine types and those having airscrews should only take about half the time of the equivalent piston engine, to build.

For instance, a piston engine will take some eighteen months from the design to the prototype stage, and then another two to three years to the commencement of production. Whereas the simple turbine/jet takes about six months to design and build in prototype form and, approximately, a further year to put into production—eighteen months in all as opposed to four years or so for the piston engine.

Further, the simple turbine/jet is about one-third of the weight of the piston engine—power for power—and its installed weight is little more than its "dry" weight; because it does not have a radiator or coolant, neither is a large quantity of lubricating oil necessary for its operation. Nor is an oil cooler required when ball or roller bearings are used instead of plain bearings.

The smoothness of operation of the gas turbine, whether used in "jet" form or with an airscrew, is such that the

airframe will undoubtedly need less maintenance than is at present required for those aircraft fitted with the high-duty piston engine and where, in consequence, there is considerable vibration.

The gas turbine can be built in a number of different forms. One is the original and classic "Whittle" type, having a single-stage centrifugal blower and single-stage turbine and operating as a pure "jet." Another form, working on similar principles, is that using a multi-stage axial blower with a turbine wheel. Both these types—centrifugal and axial—can be arranged to drive an airscrew, through double reduction gearing, by suitable proportioning of blower to turbine.

There are also turbine/airscrew combinations using axial and centrifugal blowers in series, in order to give a higher pressure ratio and improved economy. Other blower and "staging" arrangements are possible.

There is also the turbine with augmenter. This is really a turbine type fan in an annular duct surrounding the main turbine. The fan is usually connected to a ring of turbine blades located in the gas stream of the turbine proper. This augments, or supplements, the main jet stream and is, virtually, a "half-way house" between the simple jet and the turbine-driven airscrew.

These various combinations will be tried in the near future and we will then know something of their relative merits. But a good deal of intelligent guessing and calculation is in progress at the present time in an endeavour to forecast the best arrangement for a given aircraft requirement.

TURBINES OR PISTON ENGINES? (CONTINUED)

Turbine / Jet / Airscrew

The basic difference between the turbine/jet and turbine/airscrew arrangement is that the simple jet gives all its available power in the form of exhaust jet energy; the exhaust gas being ejected as a relatively small-diameter high-velocity stream (about 1,600 ft. per second), the reaction of which propels the aircraft through the air. Whereas the turbine/airscrew arrangement uses about 80 per cent. of the available turbine power to drive a normal airscrew and the remainder is employed in "jet" form. The airscrew can be considered as a large-diameter, low-velocity unducted fan.

The figure of 80 per cent. is chosen arbitrarily to illustrate this case, but the division of power as between the airscrew and the jet can be so arranged to suit any particular operating condition.

In the case of both the turbine/jet and turbine/airscrew their propulsive effect is highest when there is least difference in speed between their respective "discharges" and the speed of the aircraft in which they are fitted.

This assumes that efficiency is assessed on a change of kinetic energy basis; where input per lb. of air flow is equal to the jet kinetic energy less the kinetic energy of forward speed—

$$\frac{(Vj^2)}{2g} \quad \frac{V^2}{2g}$$

It is difficult to estimate what the operating economy of a gas turbine will be, in the air, from the fuel consumption obtained on the test bed; since at altitude it is run at conditions (higher $n/\sqrt{t}$ values) which cannot yet be exactly simulated on the test bed at sea level and "static" conditions. But this difficulty (which is similar to that of the modern piston engine having a carburettor or injection system with automatic adjustment and compensation) will eventually be overcome when we are able to test the blower and turbine, separately or combined, in special altitude test houses.

The relatively high test-bed fuel consumption of the simple turbine/jet is generally improved upon in the air, particularly at high altitude, say, 36,000ft. The reason is that—assuming constant speed (r.p.m.) conditions—the combustion temperature, or the temperature of the gases at the turbine entry, together with the temperature rise across the blower, will remain approximately constant. Therefore, since the ambient temperature is lower at altitude, there will be a higher temperature ratio across the engine and a higher pressure ratio across the blower. These effects may, however, be somewhat offset by a drop in adiabatic efficiency and the "slip" factor of the blower.

In the case of the simple turbine/jet a reasonable fuel economy can only be obtained at high speed and high altitude; since the propulsive efficiency, which is a function of jet velocity/aircraft velocity, improves with speed. Therefore, in order to obtain better fuel economy it is necessary to fly fast and high.

It is clear, therefore, that the mating of a particular turbine to its proper airframe is a most important consideration and there is no doubt that the turbine propelled aircraft must be "tailor-made" to suit its engine, or vice versa. And, in order to determine the correct size and type of turbine for a particular aircraft, it is first necessary to know the following aircraft operating requirements: Speed, operational height, range and military, or pay load.

In the case of the turbine/airscrew arrangement; this is more flexible in meeting the flight conditions of the various aircraft types of moderate speed—around 300 m.p.h.—and the airscrew can be matched to the turbine and so designed that both will give the optimum efficiency in a particular aircraft.

It would appear that for high altitude and high speed—particularly in the case of fighter aircraft—the simple gas turbine/jet combination meets the case. But, for the lower altitudes and speeds and for large aircraft, the turbine/airscrew combination will be used. I think there will be many applications of the latter, since it is not always feasible, or desirable, to fly at very high altitudes, or at extreme speeds.

The foregoing gives some idea of the future of the gas turbine. But there are a number of points, one or two of which I will mention here, that must be looked into in order to make the turbine a successful aircraft engine.

Turbines consume an enormous amount of air. This is in the order of 1 lb. per second per 50 lb. of thrust. It is important to see that the air intake is properly designed and adequate measures taken to avoid ingress of sand and foreign bodies, etc., and also to see that there is proper protection against icing. At the same time, it is very necessary to avoid entry losses, which seriously affect the efficiency of the engine.

Air-Fuel Ratio

Gas turbines, being virtually "full-throttle" engines, are affected quite seriously by the intake temperature and care must be taken to see that engines for aircraft which will fly to many parts of the world are designed with sufficient "capacity" to cope with take-off conditions in hot climates, as well as temperate ones.

It may be of interest to those who have not worked on turbines to know that the gas turbine cannot yet use the same air/fuel ratios as the ordinary piston engine. The piston engine uses the chemically correct air/fuel ratio of about 15:1, whereas that used in the turbine is in the region of 60-70:1. The reason for this high air/fuel ratio is that the temperatures must be kept lower than those in the piston engine. But improvements in the future, mainly in regard to materials, will allow high temperatures and, therefore, lower air/fuel ratios to be employed; although these ratios will still be higher than those of the piston engine.

The fuel consumption of the simple (Whittle) turbine/jet engine is higher than 1 lb. per lb. thrust per hour under "static" conditions; but we are now very close to this figure and it may be possible to get somewhat below it in the near future.

The various "staging" arrangements with blowers of the axial and centrifugal variety will, with airscrews or ducted fans, or as simple jets, give still lower fuel consumptions. And we can foresee consumptions which are better than the "full-throttle" or "take-off" figures of the piston engine; and which, in a suitably designed aircraft, will give better

TURBINES OR PISTON ENGINES?

"air miles per gallon" than the piston engine, provided that the machine is operated at the best conditions for its power plant.

In addition to the various methods mentioned here for improving the operating economy of the turbine, there is very close collaboration with the material suppliers, to give us improved materials—for blades, etc.—which will allow higher operating temperatures and so further improve the thermal efficiency. Much valuable work has been done in this direction already.

Combining the two-stroke piston engine with the gas turbine, using the former as a "gas generator" and so enabling gases to be burned at high temperature and pressure before expanding them and leading them to the turbine, will give even better results than either the piston engine or the turbine, in so far as fuel consumption is concerned; and particularly where relatively low altitude and extreme range operation are required.

As regards fuels; the gas turbine generally uses "kerosene" or "vaporising oil," but "any old fuel" will not necessarily do because it may soot or "coke" the combustion system and impair the overall efficiency. As a matter of fact, it is very necessary to have high combustion efficiency in gas turbines and, because of their large air consumption and relatively low thermal efficiency, the pressure drop through the combustion system must be kept as low as possible. And there must be no "flaming" past the turbine blades, otherwise they will overheat.

It is quite possible that "additives" to the fuel will be evolved in the future, further to improve combustion efficiency; similar to tetra-ethyl lead in petrols and ethyl nitrate and cetane in the fuels used for compression ignition engines.

Fuel Cost

It must not be supposed that gas turbine fuel will necessarily be cheap and that there will be any particular advantage over and above petrol. Because, although the price may be about one-half to two-thirds that of 100-130 grade fuel (at source), an equal amount must be added to each fuel to cover shipping and distribution charges. Therefore, if an aviation fuel costs, say, sixpence per gallon, at source, and a kerosene or vaporising oil threepence or fourpence, and tenpence or a shilling per gallon is added to each to cover distribution costs, the difference between the two is not so great as might be supposed. However, it is undoubtedly true to say that the fuel for the gas turbine will be somewhat cheaper than that for the high-duty piston engine.

In view of the relatively high fuel consumption of the turbine, there is a strong case for the fuel companies to investigate the possibility of producing a fuel which will have a very high calorific value per unit volume. I mention, specifically, "calorific value per unit volume" because we can more easily deal with weight than bulk in the modern high-speed aircraft.

It will be appreciated that the fuel for the gas turbine is, virtually, a "safety" fuel and, therefore, promises considerable advantages over the normal fuels at present used in piston engines. But, in my view, the safety aspect will be mainly confined to the tankage and piping—the fuel installation—in the aircraft and not necessarily to the engine; because the engine is like a very large "blow-lamp" and, in the event of a crash, will ignite kerosene equally as well as petrol is ignited by the piston engine. The one possible advantage the turbine has over the piston engine is that there is not so much lubricating oil used because turbines generally run on ball bearings and, therefore, there is less hazard of ignition being initiated by lubricating oil.

Compressibility Research

Air Comdre. Banks finished his lecture by, as he called it, "thinking aloud," viz., some random thoughts on future problems. The gas turbine would bring us up against compressibility effects in aircraft, and this might mean a prolonged period of research. He did not foresee "buried" engines in the wings, except possibly in the very largest aircraft types (200,000-250,000 lb. all-up weight). Wings would get thinner, and it just did not seem possible to hide the engines completely. We might have engines in the fuselage in certain types.

Future airscrews must be designed to be independent of the engine oil system. They must be proof against freezing and designed for rapid pitch change (45-50 deg. per second), to cover the feathering, braking and baulked-landing cases. He thought airscrews could be used without serious drop in efficiency at aircraft speeds of 500 m.p.h. or a little more, but this would mean thin blades, free from flutter trouble. He thought hollow steel blades had a future both for large and small diameters, at least until the airscrew itself was ousted by our ability to use the turbine/jet combination economically.

Gas turbines of the simple jet type would be smooth and also silent so far as passengers and crew were concerned, but when fitted with airscrews the noise might be more irritating than that of the combined airscrew and exhaust noise of the conventional engine.

Looking to aircraft of the future, Air Comdre. Banks said that on the civil side America had a start, but, just as America had learned something from us in military aircraft, so should we learn all we could from her in civil aircraft.

On the military side, since we were not likely ever to be an aggressor nation, we should consider the rebuilding of an up-to-date air force in two phases: the first covering principally defensive types, and the second to be brought quickly into operation after the start of a war. The first, assuming a European war, would need extremely high-performance interceptor fighters and high-speed, medium-sized bombers with enough range and load to reach the aggressor wherever in Europe he might be.

Experience in this war had, however, indicated that the aircraft with pilot and crew would have but limited use. He foresaw developments in the use of large rockets and radar-controlled missiles, some expendable and others pilotless aircraft directed and controlled to drop their bombs and return to base. Thus the only use we could make of our interceptors and high-speed bombers would be to shoot down radar-controlled and pilotless aircraft coming over this country, and to bomb heavily and at a high rate the rocket and aircraft-launching sites of the aggressor.

R.A.F. MOVED 300,000 CASUALTIES WITHOUT MISHAP

AIR MARSHAL SIR HAROLD WHITTINGHAM, Director of R.A.F. Medical Services, said recently the R.A.F. evacuated about 300,000 sick and wounded men, mostly Army personnel, on all fronts in 1944 without a single mishap, though about 20,000 separate flights had to be made. He was speaking at the U.S. Institute of Aeronautical Sciences, which presented him with the John Jefferies award for "outstanding contribution to the advancement of aeronautics through medical research."

Air Marshal Whittingham said the U.S. Army Air Force had done a stupendous job in this global war in evacuating casualties by air from all fronts to oversea bases and to the U.S. He disclosed that in 1941, during the experimental phase of adapting the Flying Fortress for operational work at higher altitudes, two R.A.F. medical officers—Sqn. Ldrs. W. K. Stewart and J. Robson—had the misfortune to be in one of them when it broke up at an altitude of 30,000 feet. Stewart was the sole survivor.

Paying tribute to U.S. Airmen, Air Marshal Whittingham said Col. Randy Lovelace, of the U.S. Army Air Force, in 1943, purposely and courageously baled out at 40,000 feet to make physiological observations in a parachute descent from such an altitude. He became unconscious almost immediately after baling out, and suffered severe frostbite of the hand, but fortunately landed safely.

Col. Boynton also met his death in an experiment.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication must in all cases accompany letters.

WITH THE HIGHER-UPS

A Clue in the Picture

I WAS interested in the two cloud photos given in the edition of January 28th under the heading "With the Higher-Ups."

With reference to the second photo showing a hole in the clouds, for which the text states that no explanation of its formation is known, I think the answer is actually given in the first picture.

If you examine the cloud formation round the hole you will see that the clouds take the form a a spiral, and it is fairly obvious that the hole has been caused by an up-current or a down-current of air which has tended to suck the cloud layer with it and thus form a vortex.

The first picture suggests that it was probably caused in the same manner as the cumulus cloud in that photo, but in this case the temperature and humidity conditions were not right for the formation of a vigorous cumulus cloud.

C. H. LATIMER-NEEDHAM.

HORACE SAYS . . . .

. . . . *Things Which Do Not Amuse Everyone*

MY attention has been drawn to your issue of Feb. 8th, in which you publish a letter under the signature of W. S. Shackleton.

If Mr. Shackleton will take the trouble to read Hansard, which reports the recent debate on civil aviation, he will notice I never once mentioned airships in my speech.

There was no need to do so, as we no longer build airships in this country, and they are not in the picture for carrying freight by air.

Mr. Shackleton's letter may be regarded by some as humorous, but in the opinion of one of the oldest pioneers of British aviation it was in exceedingly bad taste.

No doubt, Mr. Editor, you will be good enough to see that Mr. Shackleton apologises for misquoting my speech in Parliament and you will be kind enough to give the apology. I expect equal publicity in your valuable publication.

MURRAY F. SUETER,
(Rear-Admiral, Ret., M.P. for the Hertford Division of Hertfordshire.)

[As we want to publish Sir Murray's letter at the first possible opportunity, and as it was received just as we are about to go to press, there has not been time to show it to Mr. Shackleton, but we are sure he would join us in apologising for the unintentional misquotation. Mr. Shackleton was quoting the *Daily Telegraph* report, in which the word "airships" was used. What Sir Murray actually said was "air trips," viz., that it would need 1,200 air trips to carry the 5,000 tons which one small cargo ship carries on one voyage.—ED.]

IMPOSSIBILITY OF FUTURE WARS

Missiles the Size of Cargo Vessels

WITH reference to Mr. Hamilton-Adams' letter in *Flight* of February 8th, I must confess that my interest in his article gave place to astonishment and finally amusement, but, having great respect for original statements, I feel a little constructive criticism might prove helpful.

I have no quarrel with the statement that two shells of the size Mr. Hamilton-Adams contemplates would blow down every skyscraper in New York, but trust that the sight of missiles the size of a large cargo vessel, shooting out of the depths of the ocean, will not become an everyday occurrence —at least in my lifetime!

The method of firing appears rather obscure, but presumably an umbrella is held over the projectile while it is resting on the sea bed while the launching crew "put their trust in God and keep their powder dry."

Once under way, this unusual device appears to travel in the stratosphere in a straight line, supported by wings and performing a series of barrel rolls—a strange sight.

I would suggest that the propulsion method is rather doubtful as are the equations concerning the horse-power required for flight. I do not profess to be expert in these matters, but I think that ft./lbs. is meant in place of h.p. in one equation. There is also a complete contradiction in one paragraph; the author states that his weapon makes war impossible (would it were so) as it would resolve itself into the destruction and counter-destruction of civilians; unfortunately this policy seems to be the essence of modern war.

With regard to the last rather shattering paragraph, I shudder to think of myself roasting at 3,100 deg. C. if I am unfortunate enough to be on the wrong side in the wrong place; nevertheless, I express the hope that Mr. Hamilton-Adams at least will escape the terror of his own inventions.

A. R. BLAKE.

PLUGGING

Still Further Back Room Boys!

MY society, inspired by the spate of revelations which has followed Messrs. K.L.G.'s acknowledgment of the gracious tribute to British sparking plugs paid by the President of the United States, has asked me to write and state, with all due modesty, the contribution of their members.

It should never be forgotten that had not Harry Hedgecock had both engines of his mystery plane disintegrate due to detonation as he was taking off over the sewage-farm back in '38 British sparking-plug manufacturers would never have been inspired by that flow of invective, roared into the telephone even before the mud had set on Harry's moustache, which drove them to design their modern masterpieces. This movement was probably aided by Max Boostem who, on pre-igniting his forty-seventh production engine to a standstill, said: "If these Goddam plug-makers don't give me some plugs that work, *I* shall start to do the plugging"; and as he spoke he brought his fist down on the M.A.P. austerity-type table with such a wallop that all four legs failed in compression.

BERT ("BEANS-FOR-BOOST") BLENKINCLOT,
Hon. Sec., Society of Antiquated Aviators and Dilapidated Test Pilots.

ORGANISING FOR EFFICIENCY

Pre-war Success with Slow Aircraft

I SHOULD like to support Mr. K. Bartlett's view (*Flight*, February 1st) that a cruising speed of 130 m.p.h. for an air freighter is not useless.

Anyone who has studied the growth and development of British civil aviation cannot fail to have been impressed by our extraordinary success in operating airlines with regularity to the Hebrides, Orkney and Shetland Islands. On those runs by far the most useful aircraft has been the de Havilland Rapide, with its cruising speed of 130 m.p.h., and it has operated in those seas, rightly famed for their strong winds, to the entire satisfaction of the airline companies.

You have been good enough on several occasions to give space in *Flight* to accounts of some of the work of men like David Barclay, Capt. Fresson, and, most picturesque of all figures in pre-war civil aviation, Mr. Eric Gandar Dower. But the whole story has not yet been written, of Fresson's pioneering flights across the Pentland Firth in a Mono-Avro, of the first air-mail service to Shetland flown by Henry Valance in one of Gandar Dower's Dragons in the depth of winter, or of the incredible 2 × 4 field at the bottom of a valley on to which Barclay landed by means of the "Glen Brittle swerve" on the Isle of Skye. How these air services became part of the lives of the islanders before the war was evidenced by the scene of farmers, with their dogs, flying across to market on the mainland once a week.

Those airlines were built up with slow aircraft, starting with the 100 m.p.h. Monospars and Dragons, which have now given way to the Rapide. A speed of 130 m.p.h. has proved adequate under the variable weather conditions of the islands, and to use faster aircraft would be uneconomical. These are, of course, relatively short hauls, and if they were extended a higher speed might be needed to maintain passenger schedules. But the Bristol Freighter, as the name implies, is not going to be asked to cope with passengers, and air freight is not likely to need split-second timing. On the other hand, unlike the Rapide, the Freighter has 40 m.p.h. "up its sleeves," as Mr. Bartlett has shown, so that it can defeat stiff head winds should punctuality be more important than maximum economy.

JOHN GRIERSON.

AIR AID TO TITO: R.A.F. Dakotas over the Balkan coast-line. Aircraft of Transport Command and the Balkan Air Force have evacuated about 10,000 Yugoslav wounded.

SERVICE AVIATION

Royal Air Force and Fleet Air Arm News and Announcements

Appointments

THE Air Ministry announces the following appointments:—

Air Vice-Marshal G. R. MACFARLANE REID to be A.O.C., West Africa.

Air Comdre. G. HARCOURT-SMITH to be Senior Air Staff Officer, H.Q., A.C.S.E.A., and to be Act. Air Vice-Marshal.

Air Comdre. C. H. K. EDMONDS to be Air Officer in Charge of Administration, Flying Training Command, and to be Act. Air Vice-Marshal.

Air Comdre. G. H. AMBLER to be Senior Air Staff Officer, H.Q., Fighter Command, and to be Act. Air Vice-Marshal.

Promotions

TECHNICAL BRANCH.

Air Comdre. (Act. Air Vice-Marshal) E. D. DAVIS, O.B.E., to Air Vice-Marshal (temp.). Feb. 1st, 1945.

Air Comdre. (temp.) (Act. Air Vice-Marshal) J. R. CASSIDY, C.B.E., is granted the rank of Air Comdre. (war subs.), Dec. 30th, 1944.

Retirement

TECHNICAL BRANCH.

Group Capt. S. S. BENSON, A.F.C. (at his own request), retaining rank of Air Comdre. Dec. 24th, 1944.

Award

Fleet Air Arm

THE KING has been graciously pleased to approve the following award for courage, leadership and determination in anti-U-boat operations:—

Bar to Distinguished Service Cross

Act. Lt. Cdr. (A) A. M. TUKE, D.S.C., R.N.

Royal Air Force

THE KING has been graciously pleased to approve the following awards in recognition of gallantry displayed in flying operations against the enemy:—

Second Bar to Distinguished Service Order

Act. Group Capt. D. E. GILLAM, D.S.O., D.F.C., A.F.C., R.A.F.O.—Since being awarded a bar to the D.S.O. Group Capt. Gillam has completed more than 60 sorties, involving attacks on enemy troop and tank concentrations, ammunition stores, locomotives and other targets on the ground. Within recent weeks he has led formations of aircraft, against several important and heavily defended targets. These missions called for a high degree of skill and resolution, and the success achieved is a splendid tribute to this officer's outstanding leadership and ability. He has set an example of a very high order.

Bar to Distinguished Service Order

Act. Wing Cdr. A. M. MURPHY, D.F.C., D.S.O., R.A.F.—Since being awarded the D.S.O. this officer has participated in a large number of sorties, involving attacks on a wide range of targets. In these operations, Wing Cdr. Murphy has most effectively attacked many enemy locomotives; he has also been responsible for the destruction of two enemy aircraft and very many mechanical vehicles during the period. His outstanding skill, gallant leadership and iron determination have been reflected in the fine fighting qualities of his squadron which has won much success.

Distinguished Service Order

Act. Sqn. Ldr. H. G. KEILLOR, D.F.C., R.C.A.F., No. 524 Sqn.—As pilot and navigator respectively these officers have, within recent months participated in several attacks on enemy shipping during which they have shown the highest qualities of skill, courage and determination. One night in November, 1944, they attacked a force of eight E-boats near Ijmuiden. Two bombing runs were executed and a hit was obtained on the leading vessel. In spite of much fire from the ships, another attacking run was made. It proved abortive as the bombs failed to release. Undeterred, Sqn. Ldr. Keillor made three more runs over the target and finally the remainder of the bombs were released and fell close to the enemy force. Sqn. Ldr. Keillor and Flt. Lt. Wondolowski set a fine example of determination and devotion to duty throughout.

Bar to Distinguished Flying Cross

Flt. Lt. C. A. WONDOLOWSKI, D.F.C., R.C.A.F., No. 524 Sqn.—For citation see Act. Sqn. Ldr. Keillor, D.S.O., D.F.C.

F/O. E. GILLIES, D.F.C., R.A.F.V.R., No. 254 Sqn.—F/O. Gillies has completed very many sorties and has at all times shown outstanding keenness and devotion to duty. He flew with much distinction in two recent attacks on shipping in the heavily defended area of Den Helder. In November, 1944, F/O. Gillies took part in an attack on an enemy convoy. In the fight he displayed great determination and made several runs over the target to press home his attack. His example has proved most inspiring.

Act. Sqn. Ldr. J. S. BOOTH, D.F.C., R.A.F.O., No. 239 Sqn.—This officer has been employed as a flight commander in his squadron for a considerable time. He has taken part in many operational missions, during which he has destroyed two enemy aircraft and damaged two trains. On several occasions he has acted as deputy in the absence of the squadron commander, and has discharged these duties in a capable and efficient manner. In September, 1944, he gave a fine demonstration of his skill, when, while on an operational sortie to the Rostock area, one engine of his aircraft failed and he was forced to fly to base, a distance of 600 miles, with only the port engine functioning. His leadership and resourcefulness have set a fine example.

Act. Sqn. Ldr. A. C. CARTER, D.F.C., R.A.F.V.R., No. 109 Sqn.—Since the award of the D.F.C. this deputy flight commander has completed numerous sorties. In addition to his tour with Bomber Command, Sqn. Ldr. Carter has a full operational tour with Coastal Command to his credit. His sorties include attacks on many important and heavily defended targets in Germany and enemy-occupied territory. He has proved himself to be an outstanding captain of aircraft and an able leader. His devotion to duty and skill as a pilot are worthy of high praise.

Act. Sqn. Ldr. J. H. DUNK, D.S.O., D.F.C., R.A.F., No. 109 Sqn.—This navigator has now completed his third operational tour. In order to do this it was necessary for him to relinquish the rank of Sqn. Ldr., which he voluntarily did, in order to resume operational flying. He has set up a most outstanding record, and has continued to display exceptional keenness and enthusiasm, together with noteworthy ability as a navigator. Since the award of the D.F.C., he has participated in a large number of attacks, during many of which heavy opposition was encountered.

Act. Sqn. Ldr. W. M. REID, D.F.C., R.A.F.V.R., No. 97 Sqn.—Since the award of the D.F.C., this officer has continued to engage the enemy with the utmost efficiency, courage and success. As deputy flight commander, he has rendered valuable service in the training of less experienced crews. On several occasions his aircraft has been damaged by enemy action, but his cool and prompt tactics have always enabled him to press on to the target and return safely to base. In June, 1944, his aircraft was detailed to attack Gelsenkirchen. Before reaching the target one engine was damaged by anti-aircraft fire. Despite the resultant difficulties, Sqn. Ldr. Reid continued to the target and successfully completed his mission.

Act. Sqn. Ldr. D. A. RIX, D.F.C., R.A.F., No. 139 Sqn.—This officer has completed numerous operational sorties during his two tours of operations, including twelve attacks against Berlin. Sqn. Ldr. Rix is a pilot of considerable experience who, in his capacity as senior flight commander of his squadron, has set a high standard of efficiency, keenness and devotion to duty throughout his lengthy tour.

Act. Sqn. Ldr. A. D. WEBB, D.F.C., R.A.F., No. 77 Sqn.—Since the award of the D.F.C., Sqn. Ldr. Webb has continued to operate on his second tour with unremitting zeal and enthusiasm. Throughout his numerous operational sorties he has set a fine example of excellent airmanship, cool judgment and determination which has won

SERVICE AVIATION

the admiration of all members of his flight. His leadership as flight commander has materially contributed to the many successes achieved by his squadron.

Flt. Lt. E. W. ARNOTT, D.F.C., R.A.F.V.R., No. 109 Sqn.—Since the award of the D.F.C., this officer has continued to operate with determination, courage and devotion to duty of a high order. He has completed a large number of operational missions against heavily defended targets in Germany and enemy occupied territory. He has always pressed home his attacks with vigorous tenacity, which has won the admiration of all his crew.

Flt. Lt. J. R. BYLES, D.F.C., R.A.F.V.R., No. 105 Sqn.—Since the award of the D.F.C., this officer has completed numerous operational missions. He has continued to display outstanding navigational skill, determination and unfailing devotion to duty, which are worthy of high praise.

Flt. Lt. C. CHADWICK, D.F.C., R.A.F.V.R., No. 105 Sqn.—Since the award of the D.F.C., Flt. Lt. Chadwick has completed numerous operational missions; many of them of an important and hazardous nature. He has invariably shown himself to possess noteworthy skill as a pilot, and has displayed exceptional courage, judgment and devotion to duty under the most arduous circumstances. These qualities have enabled him to obtain results of the greatest value.

Flt. Lt. H. A. DAVIS, D.F.C., R.A.F.V.R., No. 109 Sqn.—Since the award of the D.F.C., Flt. Lt. Davis has continued to operate against the enemy with great skill and enthusiasm. He has shown himself to be a most capable pilot and captain of aircraft, who can be relied upon to press home his attacks regardless of the opposition. His gallantry and devotion to duty have always been praiseworthy.

Flt. Lt. J. E. L. GOVER, D.F.C., R.A.F.V.R., No. 692 Sqn.—Since the award of the D.F.C., this officer has completed many sorties, always displaying outstanding leadership, initiative and skill. On one occasion he made a determined and successful attack on Berlin despite a serious petrol leak and unserviceable navigational equipment. On another mission he accomplished a successful crash landing with a full bomb load when an engine failed shortly after taking off. During this crash, Flt. Lt. Gover was injured, but returned to operational flying immediately after leaving hospital. His courage and fine fighting spirit have been outstanding at all times.

Flt. Lt. A. HAWORTH, D.F.C., R.A.F.V.R., No. 105 Sqn.—Since the award of the D.F.C., this officer has taken part in many more operational sorties. He has continued to maintain a high standard of navigational ability and to display cool courage and devotion to duty in the face of the enemy.

Flt. Lt. E. H. E. HEARN, D.F.C., R.A.F.V.R., No. 50 Sqn.—Since the award of the D.F.C., this officer has taken part in many further operational sorties and has attacked such heavily defended targets as Berlin and Stettin. As bombing leader, his unflagging zeal, initiative and leadership on the ground, and his courageous bearing and coolness in the face of the enemy, have set an inspiring example.

Flt. Lt. K. J. LOVELESS, D.F.C., R.A.F.V.R., No. 105 Sqn.—Since the award of the D.F.C., Flt. Lt. Loveless has completed numerous further operational missions, which have demanded great skill and accuracy. He has continued to maintain a high standard of airmanship, courage and devotion to duty.

Flt. Lt. R. W. MACMILLAN, D.F.C., R.A.F.V.R., No. 161 Sqn.—Since the award of the D.F.C., Flt. Lt. MacMillan has continued to display fine technical skill and sound judgment. His determination, ability and courage in the face of extreme difficulties have played a major part in the successful completion of many missions. Throughout the numerous and varied sorties in which he has participated his unfailing devotion to duty has been most praiseworthy.

Flt. Lt. E O'CONNOR, D.F.C., R.A.F.V.R., No. 405 (R.C.A.F.) Sqn.—Flt. Lt. O'Connor has completed two tours of operational duty during which he has participated in attacks on numerous vital targets. This officer has displayed a fine fighting spirit, initiative and determination at all times which, together with his outstanding leadership and unflagging devotion to duty, have set a splendid example to all members of his squadron.

Flt. Lt. C. V. PEREIRA, D.F.C., R.A.F.V.R., No. 105 Sqn.—This officer has completed numerous operational sorties, including 14 low-level daylight attacks against heavily defended targets. Since the award of the D.F.C. he has participated in many further missions. He has continued to show exemplary courage, cool judgment and determination. His skilful pilotage and firm leadership have enabled him successfully to complete his missions however perilous the circumstances.

Flt. Lt. H. D. RILEY, D.F.C., R.A.F.V.R., No. 105 Sqn.—Since the award of the D.F.C. Flt. Lt. Riley has participated in numerous further sorties. He has proved himself an outstanding navigator, whose fine technical skill, high courage and consistent devotion to duty have largely contributed to the successes achieved by his crew.

Flt. Lt. A. E. W. WYNYARD, D.F.C., R.A.F.V.R., No. 49 Sqn.—Flt. Lt. Wynyard is now on his third operational tour. He has completed numerous successful sorties, including five attacks against targets in Berlin and fifteen against targets in the Ruhr. In July, 1944, he was rear gunner in an aircraft detailed to attack Creil. Soon after leaving the target, his bomber was attacked by an enemy fighter and sustained damage which rendered the rear turret unserviceable. Undeterred by the resultant difficulties, this officer, by manual manipulation, pressed home a counter-attack with such determination that the enemy aircraft was forced to break off the engagement. Flt. Lt. Wynyard's fine technical skill, unflagging zeal and consistent devotion to duty is worthy of high commendation.

Act. Flt. Lt. W. G. COOPER, D.F.C., R.A.F.V.R., No. 97 Sqn.—This officer has participated in numerous attacks against well-defended targets, including fourteen sorties to Berlin. Since the award of the D.F.C. he has completed many further sorties and has continued to show the greatest courage in the face of enemy opposition. During seven of his attacks against Berlin his aircraft was damaged by anti-aircraft fire; on three of them the damage was so severe that one or more engines were rendered unserviceable. Flt. Lt. Cooper's unfailing devotion to duty and outstanding ability have set an excellent example to all air bombers and are worthy of high commendation.

Act. Flt. Lt. D. B. EVERETT, D.F.C., R.A.F.V.R., No. 35 Sqn.—Flt. Lt. Everett is now on his third tour of operational duty. He has proved himself a brilliant captain of aircraft and has always displayed fine leadership, skill and determination. He has continued to show the keenest desire to operate against the enemy at all times, while his enthusiasm and efficiency have set an inspiring example to the entire squadron. Since the award of the D.F.C., Flt. Lt. Everett has participated in many attacks on widely separated targets such as Berlin, Nuremberg and areas in the Ruhr as well as in attacks in support of the Army in Normandy.

Act. Flt. Lt. T. MCNICHOLAS, D.F.C., R.A.F., No. 582 Sqn.—Since the award of the D.F.C. this officer has participated in many more operational sorties which have included attacks against heavily defended and important targets in Germany and enemy-occupied territory. As wireless operator he has throughout displayed outstanding ability and the utmost keenness to operate against the enemy. His fine record of achievements is worthy of high praise

Act. Flt. Lt. J. W. C. NAIRN, D.F.C., R.A.F.V.R., No. 405 (R.C.A.F.) Sqn.—Flt. Lt. Nairn has proved himself a most efficient navigator. During his two tours of operational duty he has participated in many attacks against heavily defended targets. His fearlessness, determination and fine fighting spirit have played a large part in the successful completion of many missions.

Act. Flt. Lt. F. N. PLUM, D.F.C., R.A.F.V.R., No. 692 Sqn.—Since being awarded the D.F.C. this officer has completed a second tour of arduous operations against heavily defended targets in Germany. Despite being involved in a serious crash and injured during this period, he has continued to fly against the enemy with outstanding courage and determination. His ability as a pilot and captain has been an inspiration to all in his squadron.

Act. Flt. Lt. K. L. PRING, D.F.C., R.A.F.V.R., No. 109 Sqn.—Since the award of the D.F.C. this officer has completed numerous operations which have demanded a high degree of skill and resolution. He has consistently displayed great keenness and determination and his gallant example has won the admiration of all members of his crew.

Act. Flt. Lt. W. E. SIDDLE, D.F.C., R.A.F.V.R., No. 83 Sqn.—This officer has a fine record of operational flying. He has participated in numerous attacks against major targets in Western Germany and occupied territory with outstanding success. His enthusiasm, courage and determination to complete his missions have made him a valuable member of his squadron. In June, 1944, his aircraft was detailed to attack Vitry-le-Francois. During the run up to the target it was attacked by a Junkers 88. By skilful evasive tactics, Flt. Lt. Siddle manœuvred his aircraft and continued to make a steady run, although his aircraft was plainly visible in the light of flares around the target.

F/O. L. L. FLETCHER, D.F.C., R.A.F.V.R., No. 571 Sqn.—Since the award of the D.F.C., F/O. Fletcher has completed a large number of operational sorties against the most heavily defended areas in Germany, including thirteen attacks against Berlin. He has continued to display fine airmanship, great determination and high courage which, together with his outstanding keenness for operational flying, have set an excellent example to all pilots.

The crest of R.A.F., Leconfield—Ex Tenebris ad Lucem (From Darkness to Light).

The crest of No. 267 Sqn.—Sine Mora (Without Delay).

F/O. C. P. HARROLD, D.F.C., R.A.F.V.R., No. 109 Sqn.—Since the award of the D.F.C. this officer has completed a second tour of operational duty. This has included many attacks against heavily defended and important targets in Germany and enemy-occupied territory. An excellent navigator, he has always evinced outstanding keenness for operational flying, great technical skill and unfailing determination to complete his missions successfully.

F/O. W. R. HORNE, D.F.C., R.A.F.V.R., No. 9 Sqn.—Since the award of the D.F.C., F/O. Horne has participated in sorties against some of the most heavily defended targets in Germany as well as in precision attacks on targets in occupied Europe. Throughout his tour he has displayed outstanding determination and courage which, coupled with a high standard of airmanship, have made him an excellent captain of aircraft.

F/O. E. LEE, D.F.C., R.A.F.V.R., No. 139 Sqn.—Since the award of the D.F.C., this officer has completed numerous operational sorties, many of which had Berlin and other heavily defended German objectives as targets. His high standard of navigational ability has been well maintained, and by his outstanding efficiency, courage and strong sense of duty, F/O. Lee has contributed much to success of many missions.

Act. Sqn. Ldr. L. D. LEICESTER, D.F.C., R.A.A.F., No. 35 Sqn.—Since the award of the D.F.C., Sqn. Ldr. Leicester has continued to operate with undiminished efficiency, determination and enthusiasm. Under his fine captaincy, his crew has achieved many successes and has set an excellent example to all the squadron. Sqn. Ldr. Leicester's attention to every detail, combined with his cool courage in the face of the heaviest opposition, is worthy of high praise.

Flt. Lt. W. W. M. DEBOOS, D.F.C., R.A.A.F., No. 627 Sqn.—Since the award of the D.F.C. this officer has participated in a number of important missions demanding navigational skill of a very high order. At all times he has shown outstanding keenness, exceptional skill and unswerving devotion to duty, which have set a magnificent example to all members of his Squadron.

F/O. K. SCHULTZ, D.F.C., R.A.A.F., No. 463 (R.A.A.F.) Sqn.—This officer has completed two tours of operational duty as pilot and captain of aircraft. He has participated in numerous attacks against the most strongly defended targets. Since the award of the D.F.C. he has continued to operate with outstanding skill, courage and devotion to duty. On one occasion in September, 1944, F/O. Schultz's aircraft was detailed for a sortie to Konigsberg. Despite intense anti-aircraft fire, he descended below cloud and obtained some excellent photographs at low level before returning to base

Flt. Lt. E. T. SHERLOCK, D.F.C., R.C.A.F., No. 427 (R.C.A.F.) Sqn.—Since the award of the D.F.C., Flt. Lt. Sherlock has completed many more successful sorties against targets in Germany and enemy-occupied territories. His work has been of an excellent standard, and his ability to make instant decisions in emergency, together with his skilful pilotage and cool judgment, have been an inspiration to his crew. He has displayed fine qualities of skill and leadership. His courage and devotion to duty are worthy of high praise.

Act. Flt. Lt. R. B. BARONI, D.F.C., R.C.A.F., No. 405 (R.C.A.F.) Sqn.—This officer has completed two tours of operations. He has participated in numerous sorties, including attacks on such major targets as Berlin, Frankfurt and Stuttgart. At all times he has displayed a fine fighting spirit, great courage and the utmost determination, which have won the admiration of all members of his squadron.

Act. Flt. Lt. E. R. HENRY, D.F.C., R.C.A.F., No. 109 Sqn.—Since the award of the D.F.C. this officer has continued to operate with outstanding skill, great courage and devotion to duty, which, combined with his unfailing determination to complete his allotted tasks, are worthy of high praise.

Act. Flt. Lt. R. H. PATTISON, D.F.C., R.C.A.F., No. 109 Sqn.—Since the award of the D.F.C. this officer has participated in numerous operational sorties, which have included a large number of precision bombing attacks against heavily defended targets in Germany. He has always displayed a fine fighting spirit, outstanding airmanship and great devotion to duty, which are worthy of high praise.

Flt. Lt. A. A. SHERLOCK, D.F.C., R.C.A.F., No. 427 (R.C.A.F.) Sqn.—This officer has completed an outstanding operational tour. Since the award of the D.F.C. he has completed many sorties against major targets in Germany and enemy-occupied territory. He has proved himself a fine pilot and an enthusiastic and resourceful captain of aircraft. Flt. Lt. Sherlock's determination, coolness and fearlessness in the face of danger have set an excellent example to his crew.

Distinguished Flying Cross

F/O. W. DOWNEY, R.C.A.F., No. 420 (R.C.A.F.) Sqn.

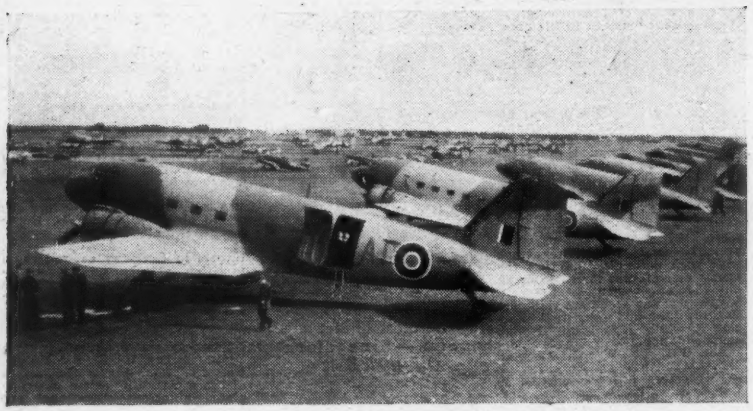
F/O. S. B. DUERN, R.C.A.F., No. 425 (R.C.A.F.) Sqn.

F/O. R. M. DUTKOWSKI, R.C.A.F., No. 427 (R.C.A.F.) Sqn.

F/O. E. P. EMERSON, R.C.A.F., No. 192 Sqn.

F/O. R. McM. FERGUSON, R.C.A.F., No. 429 (R.C.A.F.) Sqn.

F/O. R. G. FINK, R.C.A.F., No. 550 Sqn.



NO MYTH : Dakotas of the R.A.F. "Pegasus" Squadron lined up on their Italian base. This squadron carried a large part of the 8,000 tons of war material flown to Yugoslavia during the last six months.

F/O. J. G. FULTZ, R.C.A.F., No. 405 (R.C.A.F.) Sqn.
F/O. C. J. GANLEY, R.C.A.F., No. 427 (R.C.A.F.) Sqn.
F/O. J. R. F. GARNEAU, R.C.A.F., No. 425 (R.C.A.F.) Sqn.
F/O. W. GRAY, R.C.A.F., No. 432 (R.C.A.F.) Sqn.
F/O. J. E. HAMILTON-JONES, R.C.A.F., No. 420 (R.C.A.F.) Sqn.
F/O. A. B. HAMMOND, R.C.A.F., No. 139 Sqn.
F/O. O. J. HARPER, R.C.A.F., No. 408 (R.C.A.F.) Sqn.
F/O. R. HARRISON, R.C.A.F., No. 431 (R.C.A.F.) Sqn.
F/O. J. N. HETHERINGTON, R.C.A.F., No. 426 (R.C.A.F.) Sqn.
F/O. L. G. HUGHES, R.C.A.F., No. 424 (R.C.A.F.) Sqn.
F/O. F. I. IDE, R.C.A.F., No. 156 Sqn.
F/O. V. R. JOHNSTON, R.C.A.F., No. 432 (R.C.A.F.) Sqn.
F/O. W. H. JOHNSTON, R.C.A.F., No. 434 (R.C.A.F.) Sqn.
F/O. A. D. KABBASH, R.C.A.F., No. 101 Sqn.
F/O. J. T. KALLAL, R.C.A.F., No. 425 (R.C.A.F.) Sqn.
F/O. A. KALYNIUK, R.C.A.F., No. 433 (R.C.A.F.) Sqn.
F/O. T. W. KETTLEWELL, R.C.A.F., No. 405 (R.C.A.F.) Sqn.
F/O. P. A. LABELLE, R.C.A.F., No. 426 (R.C.A.F.) Sqn.
F/O. G. H. L. LAWSON, R.C.A.F., No. 426 (R.C.A.F.) Sqn.
F/O. R. R. LUNN, R.C.A.F., No. 434 (R.C.A.F.) Sqn.
F/O. R. L. MCCANN, R.C.A.F., No. 630 Sqn.
F/O. W. A. S. MCCONNELL, R.C.A.F., No. 405 (R.C.A.F.) Sqn.
F/O. J. W. MCDONALD, R.C.A.F., No. 405 (R.C.A.F.) Sqn.
F/O. N. J. MACDONALD, R.C.A.F., No. 57 Sqn.
Flt. Lt. K. H. W. DIXON, R.N.Z.A.F., No. 571 Sqn.
Act. Flt. Lt. H. STURROCK, R.N.Z.A.F., No. 171 Sqn.
Act. Wing Cdr. L. M. BLOME-JONES, R.A.F.O., No. 630 Sqn
Act. Wing Cdr. G. F. RODNEY, A.F.C., R.A.F.O., No. 626 Sqn.
Act. Sqn. Ldr. D. F. ALLEN, G.M., B.E.M., R.A.F.V.R., No. 156 Sqn.
Act. Sqn. Ldr. H. J. HOPKINS, R.A.F.V.R., No. 51 Sqn.
Act. Sqn. Ldr. G. M. KEITH, D.F.M., R.A.F., No. 139 Sqn.
Act. Sqn. Ldr. J. H. SHANLEY, R.A.F.V.R., No. 626 Sqn.
Act. Sqn. Ldr. C. C. SHERRING, R.A.F.V.R., No. 97 Sqn.
Flt. Lt. W. P. BATES, D.F.M., R.A.F.V.R., No. 105 Sqn.
Flt. Lt. A. CAESAR-GORDON, D.F.M., R.A.F.V.R., No. 105 Sqn.
Flt Lt. L. C. V. GRAY, D.F.M., R.A.F., No. 12 Sqn.
Flt. Lt. D. A. JOSEY, R.A.F.V.R., No. 103 Sqn.
Flt. Lt. J. G. ROGERSON, R.A.F.V.R., No. 141 Sqn.
Act. Flt. Lt. A. J. BOOKER, R.A.F.V.R., No. 83 Sqn.
Act. Flt. Lt. J. BREMNER, B.E.M., R.A.F.V.R., No. 35 Sqn.
Act. Flt. Lt. R. B. CANEVER, R.A.F.V.R., No. 97 Sqn.
Act. Flt. Lt. W. E. CLAYFIELD, R.A.F.V.R., No. 97 Sqn.
Act. Flt. Lt. D. CULVER, R.A.F.V.R., No. 114 Sqn
Act. Flt. Lt. H. R. DODD, R.A.F.V.R., No. 102 Sqn.
Act. Flt. Lt. H. W. HAGGERSTON, R.A.F.V.R., No. 97 Sqn.
Act. Flt. Lt. E. J. HALE, A.F.C., R.A.F., No. 77 Sqn.
Act. Flt. Lt. S. PARKER, R.A.F.V.R., No. 61 Sqn.
Act. Flt. Lt. J. C. RICHARDSON, R.A.F., No. 51 Sqn.
Act. Flt. Lt. C. SUMMERSCALES, R.A.F.V.R., No. 83 Sqn.
F/O. C. V. ALLEN, R.A.F.V.R., No. 57 Sqn.
F/O. A. W. ALLISON, R.A.F.V.R., No. 467 (R.A.A.F.) Sqn.
F/O. G. BAYNES, D.F.M., R.A.F.V.R., No. 138 Sqn.
F/O. E. BELL, R.A.F.V.R., No. 138 Sqn.
F/O. R. K. BRADY, R.A.F.V.R., No. 207 Sqn.
F/O. E. BROOKS, D.F.M., R.A.F.V.R., No. 460 (R.A.A.F.) Sqn.
F/O. E. A CARTWRIGHT, R.A.F.V.R., No. 576 Sqn.
F/O. B. A. COLLENS, R.A.F.V.R., No. 626 Sqn.
F/O. A. R. DEARDEN, D.F.M., R.A.F.V.R., No. 9 Sqn.
F/O. W. L. DONLEY, D.F.M., R.A.F.V.R., No. 78 Sqn.
F/O. A. H. A. DOWD, R.A.F.V.R., No. 77 Sqn.
F/O. N. A. FERGUSON, R.A.F.V.R., No. 207 Sqn.
Flt. Lt. A. R. H. MORRIS, R.A.A.F., No. 463 (R.A.A.F.) Sqn.
Act. Flt. Lt. A. L. BARLOW, R.A.A.F., No. 460 (R.A.A.F.) Sqn.
Act. Flt. Lt. G. GARDEN, R.A.A.F., No. 463 (R.A.A.F.) Sqn.
Act. Flt. Lt. R. D. STIRLING, R.A.A.F., No. 218 Sqn.
F/O. R. W. BOARD, R.A.A.F., No. 463 (R.A.A.F.) Sqn.
F/O. A. W. CAMPBELL, R.A.A.F., No. 460 (R.A.A.F.) Sqn.
F/O. R. F. HATTAM, R.A.A.F., No. 463 (R.A.A.F.) Sqn.
F/O. S. J. LAYTON, R.A.A.F., No. 467 (R.A.A.F.) Sqn.
F/O. T. W. G. MILLER, R.A.A.F., No. 115 Sqn.
Flt. Lt. E. A. ECKEL, R.C.A.F., No. 625 Sqn.
Flt. Lt. E. B. GRAHAM, A.F.C., R.C.A.F., No. 428 (R.C.A.F.) Sqn.
Flt. Lt. E. S. HEIMPEL, R.C.A.F., No 420 (R.C.A.F.) Sqn.
Flt. Lt. V. G. MOTHERWELL, R.C.A.F., No. 420 (R.C.A.F.) Sqn.
Act. Flt. Lt. A. C. MACDONALD, R.C.A.F., No. 83 Sqn.
F/O. S. N. E. BEAUCHAMP, R.C.A.F., No. 419 (R.C.A.F.) Sqn.
F/O. D. H. CHENEY, R.C.A.F., No. 617 Sqn.
F/O. L. A. CORBETT, R.C.A.F., No. 640 Sqn.
F/O. K. K. DAVIS, R.C.A.F., No. 431 (R.C.A.F.) Sqn.
F/O. T. R. DICKSON, R.C.A.F., No. 419 (R.C.A.F.) Sqn.
F/O. J. A. GIDDENS, R.C.A.F., No. 207 Sqn.
F/O. L. E. LA FOND, R.C.A.F., No. 419 (R.C.A.F.) Sqn.
F/O. H. H. LONG, R.C.A.F., No. 630 Sqn.
Act. Sqn. Ldr. R. C. EARL, R.N.Z.A.F., No. 75 (N.Z.) Sqn.
Act. Flt. Lt. V. J. ANDREW, R.N.Z.A.F., No. 75 (N.Z.) Sqn.

Distinguished Flying Medal

Flt. Sgt. A. G. BROWN, R.A.A.F., No. 460 (R.A.A.F.) Sqn.
Flt. Sgt. L. K. ENGEMOEN, R.C.A.F., No. 420 (R.C.A.F.) Sqn.
Flt. Sgt. E. J. BROWNE, R.C.A.F., No. 630 Sqn.
Flt. Sgt. E. BOYLES, R.A.F.V.R., No. 51 Sqn.
Flt. Sgt. L. DAGNALL, R.A.F.V.R., No. 192 Sqn.
Flt. Sgt. G. W. HATTON, R.A.F.V.R., No. 51 Sqn.
Flt. Sgt. S. G. D. L. MAJOR, R.A.F.V.R., No 9 Sqn.
Flt Sgt. Le-R. E. O'NIONS, R.A.F.V.R., No. 166 Sqn.
Flt. Sgt. T. O'TOOLE, R.A.F.V.R., No. 405 (R.C.A.F.) Sqn.

Burma and Yugoslavia

THE KING has been graciously pleased to approve the following awards :—

Distinguished Service Order

Sqn Ldr. R. G. K. THOMPSON, M.C., R.A.F.O., attd. 77th Indian Infantry Brigade.—Sqn. Ldr. Thompson is the senior R.A.F. officer of the 77th Indian Infantry Brigade and R.A.F. Adviser to the Brigade Commander on all matters of air support. In the performance of these duties he has always shown the utmost ingenuity and resourcefulness. During the battles round Henu Block his work played a decisive part in the fighting. On one occasion he joined in a charge and himself killed two Japanese. In the planning of the airborne landing and in its execution Sqn. Ldr. Thompson's sound judgment was of the greatest assistance. In the battle of Mogaung, between May 31st and July 27th, 1944, he organised the construction of forward airbases, including the laying of light aircraft landing strips, by the ingenious use of local material. The evacuation of a large number of casualties was greatly facilitated by the use of these landing strips and the effect on the morale of the fighting troops was important. To ensure the success of direct air support in the Mogaung area Sqn. Ldr. Thompson organised a system of communication with bomber pilots, thus enabling our troops to take immediate advantage of close bomber support. Although he was sick during the operations which were conducted to reduce a series of strong points at Natyegon and other places by direct air support, his energy, resource and knowledge contributed largely to the success of the operations. By his example and leadership throughout he has set a fine example to other officers of his formation.

Military Cross

Act. Sqn. Ldr. R. J. JENNINGS, R.A.F.V.R., attd. Indian Infantry Brigade.—As senior R.A.F. Liaison Officer of the Brigade, Sqn. Ldr. Jennings has shown unfailing courage, skill and energy. He has carried out repeated reconnaissance in the face of the enemy. On April 8th 1944, he was wounded in three places by grenades but continued to show an example by his disregard of danger. He personally killed four Japanese.

Flt. Lt. J. GILLIES, D.F.M., R.A.F., No. 79 Sqn. —On the night of March 27th, 1944, Flt. Lt. Gillies, with a small patrol, penetrated into an enemy ammunition dump at Indaw, Burma. After he had rejoined the main force he was ordered to proceed to the R.A.F. working in support and explain the layout of the dump area. He also arranged to indicate the target for the bombers. On April 4th 1944, Flt. Lt. Gillies flew as passenger in a light aircraft, and placed smoke bombs around the target area from a height of fifty feet, enabling the bombers to attack the target with great precision. The raid was highly successful. Throughout the whole campaign Flt. Lt. Gillies' enthusiastic devotion to duty, and his ingenious ideas were of the utmost value.

Flt. Lt. G. ALLAN, R.N.Z.A.F., attd. the Lancashire Fusiliers.—On May 27th, 1944, Flt. Lt. Allan, with a small detachment, was ordered to remain in an observation post near Lamai for the purpose of directing air support and to report, by wireless, enemy movements and dispositions. As his party was very small he was told he might leave if his position was threatened, but he remained isolated for six weeks, during which he directed ten bombing attacks and gave most valuable information of enemy movements. Later, when ordered, he led his detachment forty miles through hills and jungle to join the Brigade. On June 19th, 1944, Flt. Lt. Allan requested air support to deal with an enemy troop train which he had observed. As a result our aircraft destroyed the train, probably causing heavy casualties to the passengers. On April 17th, 1944, Flt. Lt. Allan, with a small escort, encountered a Japanese patrol in the Tonlon area and, with his escort, blocked the track and awaited the arrival of the column which was moving up behind them. This officer himself killed one of the enemy. Flt. Lt. Allan has proved himself an outstanding officer and a source of confidence to the men.

Act. Flt. Lt. B. J. V. YOUNG, R.A.F.V.R., attd. the South Staffordshire Regiment.—Flt. Lt. Young was attached to the battalion headquarters throughout the whole campaign and rendered valuable assistance in supply dropping and, especially, direct air support. On the nights of March 15th, 16th and 17th, 1944, when Henu Block was attacked, everything depended on the success of the supply dropping. This officer supervised the layout of fire markers to guide the support aircraft. These fires were situated in positions exposed to enemy mortar and small arms fire. Despite this the fires were maintained. On the night of April 13th, 1944, Flt. Lt. Young was in an observation post at Henu Block ready to direct the air support at dawn. The observation post was knocked out during the night by enemy shell and mortar fire, but this officer although only 200 yards from the bomber target took up his position in the open and coolly directed the bombers to their objective. The enemy was wiped out and the position stabilised. Again, at Mogaung on June 8th, 1944, this officer's observation post was heavily shelled, causing a number of casualties, but he continued to direct the aircraft to enemy positions although he was in the open. The coolness and accuracy with which he directed air support, on occasions within 70 yards of our men, greatly contributed to the morale of our troops, to the successful holding of the Henu Block and to the complete demoralisation of the enemy. Throughout the whole campaign Flt. Lt. Young showed a complete disregard for his own safety.

P/O. I. MCGREGOR, R.A.F.V.R.—P/O. McGregor has been operating in Yugoslavia. In May, 1944, in conjunction with some partisan soldiers, he suc-

SERVICE

AVIATION

ceeded in saving nine loads of food and ammunition which had been dropped and which were in danger of capture by the Germans, who were searching for his party, both by air and with armoured cars. While returning from such missions, P/O. McGregor has frequently had to pass through difficult and dangerous country. On one occasion he displayed outstanding courage and resource, when he conducted 64 American airmen through enemy-held territory to safety. In September, 1944, he flew on the first sortie to a new landing ground. On arrival it was found to be uncertain whether the enemy or the partisans were in occupation of the area. P/O. McGregor landed by parachute and found friendly troops on the landing ground; thus a serious delay in evacuating wounded and escaped prisoners was avoided. P/O. McGregor has always shown commendable courage and ability.

Flt. Lt. K. B. CHISHOLM, D.F.M., R.A.A.F.
Flt. Lt. E. GABRAD-COLE, R.A.F.O.

Military Medal

Act. Sgt. A. M. FRAZER, R.A.F.V.R., attd. 77th Indian Infantry Brigade.—Sgt. Frazer was a wireless operator in a party occupying an observation post at Henu Block on the night of April 13th, 1944. The object was to direct air support at dawn. During the night the observation post was heavily shelled and mortared and a number of casualties was sustained. The wireless set was destroyed, but Sgt. Frazer immediately went back for another set, returning to the post under enemy fire. A similar incident occurred during the attack on Mogaung on June 8th, 1944, but this non-commissioned officer kept his wireless set working. On both these occasions his skill and courage were largely responsible for the success of the air support.

Cpl. W. H. WROUGHTON, R.A.F., British Military Mission, Yugoslavia.—This airman, a W/T operator, served with the British Mission in Yugoslavia for over a year and worked under hard and difficult circumstances. On many occasions he has been under fire but has always displayed courage and disregard of his personal safety, which impressed the partisans and did much to raise British prestige. Cpl. Wroughton was in Drvar when the enemy made an airborne attack. He displayed great coolness and succeeded in carrying away valuable signals stores which greatly helped in the re-establishment of wireless contact with Bari. During the following fortnight he displayed tireless courage and energy.

A/C.2 H. HOKE, R.A.F.V.R.—A/C.2 Hoke is an airman of outstanding courage and fortitude. During January and February, 1944, at very grave personal risk, he penetrated deep into enemy territory and remained there for a month. As a result of this mission, information of the highest possible value was obtained from an area which was at that time beyond the range of photographic reconnaissance. A/C.2 Hoke was at all times displayed the greatest determination to fulfil his allotted tasks.
W/O. W. A WEAVER, R.A.F.V.R.

Foreign Decorations

THE KING has granted unrestricted permission for the wearing of the undermentioned decorations, conferred upon the personnel indicated, in recognition of valuable services rendered in connection with the war:—

Conferred by the President of the National Government of the Republic of China

Cloud and Banner Decoration (Special Rosette)

Group Capt. E. S. BURNS, R.A.F.
Group Capt. E. A. DOUGLAS-JONES, R.A.F.
Wing Cdr. R. S. ALLEN, D.S.O., D.F.C., R.A.F.O.

Conferred by the President of the Republic of Poland

Cross of Valour

Capt. K. St. G. HAYWARD, S.A.A.F.
Lt. A. F. CLOETE, D.F.C., S.A.A.F.
F/O. E. J. FLETCHER, R.A.A.F.
F/O. P. F. RAW, R.A.A.F.
Flt. Sgt. E. W. PAYTON, S.A.A.F.
Sgt. F. H. WILLIAMS, R.A.F.

Roll of Honour

Casualty Communiqué No. 472.

THE Air Ministry regrets to announce the following casualties on various dates. The next of kin have been informed. Casualties "in action" are due to flying operations against the enemy; "on active service" includes ground casualties due to enemy action, non-operational flying casualties, fatal accidents and natural deaths.

Of the names in this list 99 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Flt. Sgt. J. McGarrie; Flt. Sgt. W. B Mason, D.F.M.; F/O. A. Matheson; Flt. Sgt. A. G. T. Saunders; F/O. J. Whittington.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. W. H. Cryer; Flt. Sgt. E. F. Botting; W/O. F. R. Brown; F/O. R. J. Elderfield; Sgt. R. A. Hooker; Sgt. S. Hughes; Flt. Sgt. M. R. Hunt; F/O. E. J. Jay; F/O. S. Kidd; Flt. Sgt. L. Robinson; F/O. V. M. Sparkes; Act. Flt. Lt. J. E. Wood.

WOUNDED OR INJURED IN ACTION.—W/O. A. Cooper; Flt. Sgt. J. B. Wilson.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Sgt. T. V. Eastham.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. W. A. Adams; Sgt. T. Aisbitt; Sgt. R. J. Doughty; Flt. Sgt. E. R. Dunford; F/O. W. H. Escritt; F/O. L. W. Harding, D.F.C.; Flt. Sgt. H. N. Harrison; F/O. G. S. Lambert; Sgt. H. Law; Sgt. H. C. Martin; Act. Sqn. Ldr. G. D. Matthews; Flt. Sgt. C. Nunn; Flt. Sgt. R. Page; Flt. Sgt. A. Redmayne; P/O. J. H. H. Springgay; P/O. C. J. Thorne.

MISSING.—Act. F/O. N. F. Aldred; P/O. A. Astle; F/O C. Beatson; P/O. A. W. Benting; Flt. Sgt. D. J. Blencowe; F/O. J. E. Bodenham; Sgt. R. B. Bond; F/O. R. C. Booth; F/O. E. Bourton; Sgt. R. O. Bundy; Sgt. D. Cahill; Sgt. A. Campbell; Flt. Lt. C. B. Carter, D.F.C., D.F.M.; Act. Flt. Lt. C. P. Clark; Sgt. L. Cohen; Act. F/O. G. Coleman; Act. Sqn. Ldr. A. W. A. Compton; Sgt. J. P. Cooke; Flt. Lt. J. Dickson, D.F.M.; Act. Flt. Lt. K. P. C. Doyle, D.F.C.; F/O. S. F. Durrant; Sgt. H. N. Eato; W/O. W. H Edinburgh; Act. F/O. N. J. Evans; Sgt. C. F. Farley; Sgt. A. R. Fellows; Flt. Sgt. F. E. Fuller; F/O. J. A. Goggin; F/O. C. E. M. Graham, Flt. Sgt. D. K. Green; F/O. W. T. Grew; F/O. D. W. Guttridge; P/O. J. D. Harper; Sgt. D. Harrison; Sgt. T. Hawthorn; Flt. Sgt. E. Hill; Sgt. R. S. Hond; Flt. Sgt. K. Hunter; P/O. R. W. James; F/O. J. Johnstone; Sgt. J. McD. Kerr; F/O. J. C. King; Sgt. J. D. Lakin; Flt. Lt. J. A. Lamberton; Sgt. R. Larcombe; F/O. C. D. Lucas; Flt. Sgt. H. H. MacFarlane; Sgt. J. McGuckin; F/O. J. McGurk; Flt. Sgt. P. M. Matthews; F/O. H. F. Morrish; Sgt. A. J. Mouat; Sgt. D. R. Muxlow; Sgt. W. C. Norman; Sgt. R. L. Nutbrown; Flt. Sgt. G. T. Oldbury; Sgt. B. Parker; Sgt. R. E. Pearce; F/O. R. H. Petch, D.F.C.; F/O. P. S. Pilcher; P/O. W. R. Pring; Flt. Sgt. J. Purdham; Sgt. J. E. Roberts; Flt. Sgt. W. J. Roberts; Sgt. F. A. Scales; F/O. J. H. Siddell; Sgt. D. A. P. Snoxell; W/O. A. H. Spire; Sgt. D. Spowart; Sgt. K. Steele; Sgt. A. Stephen; Act. Flt. Lt. D. E. R. Stone; Sgt. R. C. Stopp; Act. Flt. Lt. G. S. Stout, D.F.C.; Sgt. A. K. Sutton; F/O. J. S. R. Swanson; F/O. K. E. F. Taylor; P/O. F. G. Totterdell; Flt. Sgt. E. H. Tunnell; Sgt. P. E. Tuthill; Sgt. A. J. Ward; F/O. R. D. Ward; Act. Sqn. Ldr. D. M. Wellings, D.F.C.; Sgt. R. A. Wells; F/O. G. A. White; Flt. Sgt. P. L. Whittaker; F/O. H. Wilkinson.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Flt. Sgt. L. Brewer; W/O. S. Brumhead; Flt. Sgt. R. Ferguson; Flt. Sgt. W. H. Lillywhite; F/O. G. W. Lucas, D.F.C.; Flt. Lt. R. R. McNair-Taylor; Sgt. D. R. Sharman; Act. Flt. Lt. A. J. Tisshaw; Sgt. F. A. White.

KILLED ON ACTIVE SERVICE.—Sgt. A. E. Allsop; Sgt. C. G. Ayres; Flt. Lt. J. R. Brew, D.F.C.; Sgt. S. W. Chambers; Sgt. G. S. Dawes; F/O. J. G. Demel; Sgt. J. L. Doveton; Sgt. E. Evans; Sgt. P. N. Gent; Flt. Sgt. T. R. T. Gooding; Sgt. A. H. Green; P/O. A. V. Herbert; A/C.2 G. S. Hodgson; P/O. J. C. Hubble; Sgt. J. E. Maddocks; Cpl. R. S. Palfreyman; W/O. N. L. Pretlove; Sgt. R. Pullman; Flt. Sgt. F. A. H. Stephenson; Sgt. P. R. Thornton; W/O. V. A. J. Woodward.

WOUNDED OR INJURED ON ACTIVE SERVICE.—L.A/C. S. Burley; W/O. C. M. Cook; L.A/C. T. C. Dixon; L.A/C. L. H. Essex; Sgt. N. Hewson; L.A/C. T. E. Marshall; Sgt. T. Richardson; Flt. Sgt. W. Thom; Flt. Sgt. W. T. Till; Flt. Sgt. C. W. Weeks; W/O. W. E. A. Wharfe; Flt. Sgt. N. A. Windust.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Cpl. E. H. Allen; W/O. P. A. Allen; Act. Flt. Lt. R. G. Evans-Evans.

DIED ON ACTIVE SERVICE.—Cpl. J. C. Broom; Sqn. Ldr. J. D. E. Dudley; Sqn. Ldr. G. H. Hammock; Sgt. A. E. Hart; L.A/C. L. C. Lansdowne; Sgt. W. Moralee; L.A/C. E. J. Pegrum; L.A/C. M. Pringle; A/C.2 T. A. Rhoden; Sgt. W. Ross; L.A/C. C. F. G. Sargent; F/O. J. Steeper-Owens; L.A/C. P. G. Symons; L.A/C. S. J. Taylor; Sgt. A. L. Turnell.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Flt. Sgt. W. A. Blake; Flt. Sgt. L. Burton; Flt. Lt. E. A. Drake; W/O. R. O. Ellis; Flt. Sgt. W. A. G. Kibble; F/O. R. M. King; Flt. Sgt. G. Tipping.

Women's Auxiliary Air Force

DIED ON ACTIVE SERVICE.—A/C.W.1 E. D. Hobbs.

Royal Australian Air Force

KILLED IN ACTION.—F/O. A. T. Fitzpatrick, D.F.M.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. A. Pearce.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. F. A. Beyer; Flt. Sgt. C. Hemingway; Flt. Sgt. R. M. Hollingworth; P/O. P. N. Kingston; Flt. Sgt. D. O. Morley; Flt. Sgt. L. P. Sanderson; Act. Flt. Lt. L. A. Smith; F/O. D. S. Thom; F/O. A. T. Tuck, D.F.C.; P/O. N. J. Veech.

MISSING, BELIEVED KILLED IN ACTION.—W/O. M. B. Crockett; W/O. A. H. M. Davidson; F/O. J. H. Ferguson; W/O. J. K. S. Radnidge.

MISSING.—Flt. Sgt. G. Caveridge; P/O. N. J. Costin; Flt. Sgt. R. C. Coventry; Flt. Sgt. W. A. Dickson; Flt. Sgt. R. D. Healy; F/O. T. J. Lennie; Flt. Sgt. P. H. M. Levey; Flt. Sgt. J. R. McIntyre; F/O. L. R. McMonagle; Act. F/O R. J. Miller; F/O. J. W. Murray; Flt. Sgt. W. A. Stephens; Flt. Sgt. T. A. P. Taylor; Flt. Sgt. J. N. Tresidder; Flt. Sgt. B. L. William.

KILLED ON ACTIVE SERVICE.—Flt. Lt. A. T. Roberts.

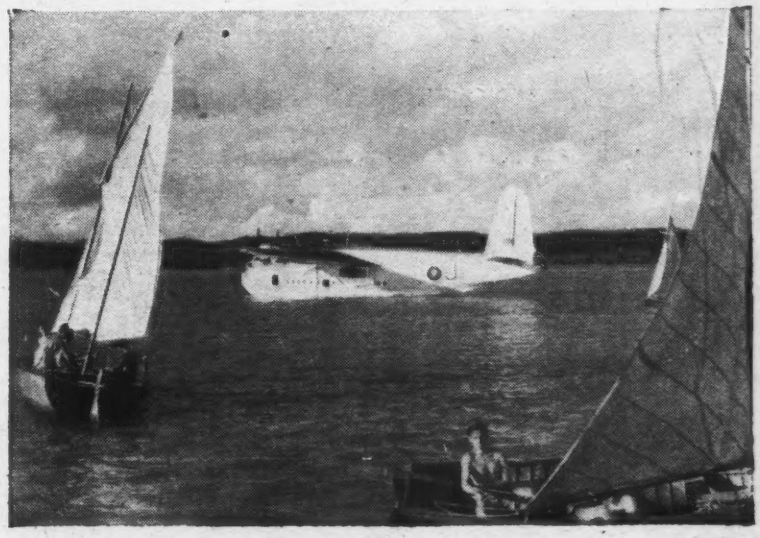
PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Sgt. G. McD. Curwood.

Royal Canadian Air Force

KILLED IN ACTION.—Flt. Lt. R. R. Bouskill, D.F.C.; Flt Sgt. S. P. Cormier; F/O. E. R. Davey; F/O. G. R. G. Kite; Flt. Lt. G. A. Long; Flt. Sgt. E. M. Milks; F/O. L. E. E. Robinson; Flt. Sgt. H. J. Steil; F/O. F. M. Stickel.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. W. G. Arnold; Flt. Sgt. J. G. Bennett; F/O. J. F. Bower; W/O. K. L. Dale; F/O. R. W. Hill; P/O. F. W. B. G. Hingston; P/O S. M. Kent; P/O. R. W. McManaman; P/O. G. I. Raymond.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. D. G. Addison; W/O C. G. Baker; P/O. E. D. Bonin; Sgt. F. L. Brisco; F/O. G. O. Carefoot; F/O. E. L. Clary; Flt. Sgt. V. A. F. Cleveland; F/O. C. M. Cotting-



YACHTING WEEK IN CEYLON: Coastal Command airmen off duty sail round a Sunderland at its moorings. Sailing has a wide appeal both in the R.A.F. and in the aircraft industry.

SERVICE AVIATION

ham; W/O. F. H. Davis; Flt. Sgt. K. G. Davis; Flt. Sgt. P. W. Dries; F/O. L. Durbin; W/O. R. S. W. Esmay; F/O. M. I. Fraleigh; Sgt. G. W. Fraser; F/O. W. A. Gardiner; Sgt. W. C. Gilchrist; Act. Flt. Lt. C. J. D. Greenland; P/O. C. H. Guest; P/O. R. C. Harding; F/O. T. R. Hoffman; Flt. Sgt. A. S. Hopping; P/O. R. B. Jackson; Flt. Sgt. J. M. Jacob; F/O. W. H. Jacobs; P/O. W. Kerslake; W/O. C. J. E. Kindt; W/O. J. A. R. Langlois; P/O. R. E. McComb; F/O. A. P. McCracken; Flt. Sgt. A. S. MacDonald; Flt. Sgt. F. T. A. McKernan; Sqn. Ldr. J. P. McMillan; Flt. Sgt. J. E. Marchant; P/O. H. F. Maughan; Sgt. R. K. Megit; P/O. K. R. G. Millar; Sgt. M. S. Miller; Sgt. E. Munsterman; Flt. Sgt. C. M. Niven; Flt. Sgt. H. G. Northway; W/O. R. S. Orr; Sgt. H. E. Petersen; Sgt. E. Podborochinski; P/O. A. F. Scanes; F/O. R. C. Scott; P/O. G. M. Shouldice; Flt. Sgt. J. R. R. Small; F/O. F. G. Spanner, D.F.C.; Flt. Lt. H. W. J. Stewart, D.F.C.; F/O. B. A. St. Louis; Sgt. G. W. Sutherland; Act. Flt. Lt. H. T. Taerum, D.F.C.; F/O. F. H. Viney; Flt. Lt. T. J. D. Waterman, D.F.C.; Act. Flt. Lt. A. J. Whiston; F/O. F. P. Wilson.

MISSING.—P/O. W. N. Auld; F/O. W. Baker; Flt. Sgt. C. J. Brady; F/O. W. S. Burns; P/O. V. B. Christie; Sgt. H. E. Colman; F/O. J. M. Dunsmuir; F/O. A. B. Harvey; F/O. O. G. Korpela; F/O. A. J. A. Lavoie; F/O. G. J. McKenzie; Sgt. J. G. Mackey; F/O. J. A. Noble; Flt. Sgt. T. C. Passey; P/O. V. L. Pearson; F/O. W. A. Rupert; F/O. C. R. Ryerse; Flt. Sgt. J. K. Scott; W/O. J. L. Springsteele; F/O. J. G. Stables.

KILLED ON ACTIVE SERVICE.—F/O. R. G. Campbell; P/O. R. T. F. Collins; F/O. M. J. G. Cooke; W/O. G. A. MacLeod; Flt. Sgt. G. Noble; Sgt. G. E. Opie; Flt. Sgt. F. E. Thistle; Sgt. Z. Wasserman; Flt. Sgt. H. A. Wintermute.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Sgt. H. J. Morris; Flt. Sgt. P. Tomchyshyn.

DIED ON ACTIVE SERVICE.—Cpl. J. J. B. Bordelcau.

Royal New Zealand Air Force

KILLED IN ACTION.—W/O. M. J. L. Phelan.

MISSING.—P/O. A. R. Galletly; Act. F/O. G. A. Green; Flt. Sgt. C. R. Leslie; Flt. Sgt. S. E. Mosley.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—W/O. J. A. Newman.

South African Air Force

KILLED IN ACTION.—Lt. D. V. Bartholomew; W/O. J. H. Brits.

MISSING, BELIEVED KILLED IN ACTION.—W/O. N. H. Attwell; W/O. E. W. Aylett; Lt. J. H. Dutoi; Capt. Hadietrich; 2/Lt. W. T. Nagel; Lt. H. P. Oosthuizen.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Lt. J. T. Rowan.

Casualty Communiqué No. 473.

Of the names in this list 103 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Sgt. R. C. Daynes; P/O. R. R. Dixon; F/O. D. N. Edwards; Sgt. A. J. L. Lee; Sgt. J. G. Lee; Flt. Sgt. R. M. McGregor; F/O. E. D. Scotland; Sgt. H. R. C. Soan; Flt. Sgt. J. B. Teather; F/O. S. D. Thyagarajan; Sgt. C. E. Townsend.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. R. W. Elder; Sgt. E. C. McLaughlin.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Lt. R. J. Andrews; Sgt. S. A. Barton; Flt. Sgt. C. Baynton; Sgt. D. C. Bolton; Sgt. R. W. Branchflower; Sgt. G. H. Brittle; Sgt. M. H. Britton; Sgt. C. D. Brown; W/O. W. D. Brown; P/O. D. E. Cake; Sgt. R. Charlton; Flt. Lt. J. F. Cobbett; Sgt. R. S. Colvin; Act. Flt. Lt. J. K. Cox; Flt. Sgt. D. W. Croker; Sgt. J. Currie; Flt. Sgt. W. A. Dunbar; W/O. A. H. Flett, D.F.M.; F/O. M. L. B. Frankson; Sgt. A. J. B. Gildare; Flt. Sgt. A. C. Goodwin; P/O. H. Gracey; Sgt. A. E. Grant; Flt. Sgt. F. H. Haegi; Flt. Sgt. P. M. Hayes; Sgt. W. G. Holme; Sgt. V. S. Hughes; F/O. J. Hunter; F/O. G. W. James; P/O. D. C. Johnston; Sgt. E. W. H. Johnston; F/O. K. S. Lear; Sgt. A. B. McDonald; Flt. Sgt. G. F. S. Maunders; F/O. W. R. E. North, D.F.C.; Sgt. R. R. Norton; Flt. Sgt. H. A. Paul; Sgt. F. C. Perrett; Sgt. D. J. Poole; P/O. C. Priest; Flt. Lt. R. N. Ridley; Sgt. D. Roots; Flt. Sgt. J. Shelton; Sgt. L. C. J. Street; Sgt. C. R. Underhill; Sgt. H. A. Van Hal; P/O. A. W. Whitmarsh, D.F.M.; Sgt. H. W. Whitmore; Sgt. F. Wilkinson; Sgt. J. Williamson; Sgt. G. H. E. Willmott; F/O. A. G. Wood.

WOUNDED OR INJURED IN ACTION.—Sgt. G. J. V. Berryman; Flt. Sgt. G. L. Young.

MISSING, BELIEVED KILLED IN ACTION.—L.A/C. J. Anderson; L.A/C. J. C. Brooks; Flt. Sgt. H. G. Clarke; Sgt. M. Convy; A/C.2 H. Highton; Flt. Lt. C. J. G. Howard; L.A/C. E. H. Lascelles; P/O. R. D. Lucan; Sgt. J. Truby; F/O. D. T. Watkins, D.F.C.; W/O. P. E. Woods.

MISSING.—Sgt. P. A. Alger; Sgt. R. G. Allen; Sgt. R. W. Ames; Sgt. S. Ashmore; Sgt. N. A. Atkins; Flt. Sgt. E. Bennett; F/O. H. Black; Flt. Lt. G. E. Bray; P/O. A. R. Brown; Sgt. G. F. Burgiss; F/O. G. E. Cansell; Sgt. H. W. Clarke; Sgt. K. S. Cox; Sgt. S. A. Cracknell; Flt. Sgt. G. W. Dawson; Sgt. H. T. Dickson; F/O. H. Dodds; P/O. C. G. Draper; Sgt. N. Elvish; W/O. W. Erickson; Sgt. T. Fenwick; Sgt. C. Fernie; Sgt. L. Finch; Sqn. Ldr. R. H. Franklin; P/O. T. Gilchrist; Sgt. S. G. Griffiths; W/O. C. H. Gunby; Flt. Sgt. H. R. Harris; P/O. E. A. Hartley; P/O. F. C. Hawkins; Act. Flt. Lt. P. N. Herbert; Sgt. H. W. Hesketh; F/O. H. W. Honig; Flt. Sgt. T. Horrocks; Flt. Sgt. T. J. Hurdiss; Sgt. R. C. R. Johnson; Flt. Sgt. A. H. Kerfoot; Sgt. H. R. Knight; Sgt. A. Laidlaw; Sgt. R. C. E. Lammas; Sgt. J. E. H. Lander; Sgt. T. A. Lawless; Sgt. N. Lawrence; Sgt. J. Lee; Sgt. H. Lewis; Sgt. J. P. Lynch; Flt. Sgt. W. McCall; Sgt. D. McKay; W/O. C. McLaughlin; W/O. G. J. Manlow; F/O. A. Mason; P/O. A. L. Mayers; Flt. Lt. N. L. Morrison; Sgt. A. G. Murphy; F/O. L. C. Newman; Flt. Sgt. C. M. Owen; Sgt. A. J. P. Panther; P/O. A. W. Paul; Act. F/O. J. P. Perry; Sgt. J. Picken; Sgt. G. I. Rees; Flt. Sgt. B. L. Roberts; Sgt. P. J. Sheehy; Sgt. D. R. Smith; Sgt. E. W. Smith; F/O. T. Sorenson; Sgt. R. A. Steel; P/O. W. Stones; P/O. A. E. Stuart-Cox; F/O. C. J. Swann; Flt. Lt. T. J. Tate; Sgt. R. Thew; Sgt. A. J. Tippin; Sgt. D. R. G. Watkinson; Sgt. C. S. Webb; F/O. D. J. K. White; Sgt. C. Wilkinson; Flt. Lt. R. H. Williams, D.F.C.; Flt. Sgt. E. E. Wood; Flt. Sgt. P. C. Woods; Act. Sqn. Ldr. D. R. C. Wyness, D.F.C.; Flt. Sgt. H. G. Wynn.

KILLED ON ACTIVE SERVICE.—L.A/C. R. A. Balden; Flt. Sgt. D. F. Buist; Sgt. W. H. Chappell; Sgt. D. F. Croxton; F/O. W. W. R. Dawes; Sgt. F. R. Ellis; Flt. Lt. D. J. Falconer; P/O. H. G. Haddrell; L.A/C. J. F. Handford; Sgt. P. N. Hewitt; Sgt. H. D. Hudson; A/C.2 C. G. Hussey; W/O. M. F. James; L.A/C. E. McBriar; A/C.2 O. M. McColgan; Flt. Sgt. T. Newman; Sgt. J. Nielsen; L.A/C. S. G. Sargeant; Flt. Lt. J. K. Shaw; A/C.2 D. Snashall; W/O. G. Symonds; Sqn. Ldr. A. L. Vipan; Cpl. T. W. Whitaker; Sgt. V. S. Wright.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Wing Cdr. C. R. Hancock, O.B.E., D.F.C.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Cpl. E. R. Smale.

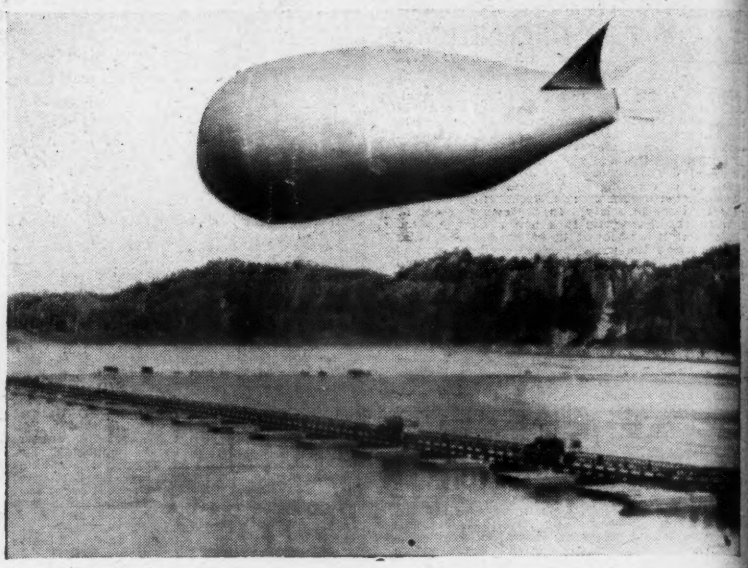
DIED ON ACTIVE SERVICE.—A/C.2 F. R. Bryant; Flt. Lt. J. C. Budd; A/C.1 A. E. Carter; A/C.1 G. W. Carter; Sgt. P. S. Cotter; L.A/C. G. Craddock; Sgt. H. A. Curtis; Cpl. H. Davies; Sgt. W. Downs; Sgt. E. S. Dyson; L.A/C. L. M. Evans; A/C.1 J. Graydon; L.A/C. H. Griffiths; L.A/C. J. H. Harris; L.A/C. S. Hayes; L.A/C. P. Hope; Cpl. C. C. Marriott; A/C. R. Turner; A/C.2 H. M. Watson; L.A/C. H. W. B. Williamson; L.A/C. J. G. Wright.

Women's Auxiliary Air Force

DIED ON ACTIVE SERVICE. — L.A/CW. B. Williams.

Royal Australian Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. A. P. Brander; P/O. J. L. Carrington; Flt. Sgt. E. C. Clunas; W/O. J. Gamble; Sgt. A. C. Glenwright; P/O. C. L. Gynther; Flt. Sgt. J. F. Knapp; Act. W/O. C. W. Knox, D.F.C.; Flt. Sgt. A. J. Lynch; F/O. W. Raper; F/O. W. A. Robertson; P/O. J. A. Tamsett; Flt. Sgt. J. G. Wade; Act. Flt. Lt. R. H. Wedd.



BLIMPS IN BURMA : The first barrage balloons to fly over Burma are used to guard the longest Bailey bridge in the world—over the Chindwin, near Kalewa.

MISSING, BELIEVED KILLED IN ACTION.—F/O. A. H. Munroe; P/O. E. Thompson; P/O. T. L. Williams

MISSING.—Flt. Sgt. C. W. Beckingham; W/O. S. A. Hamilton; W/O. W. Q. McGeachin; Flt. Sgt. S. McLean; P/O. W. E. Maloney; W/O. K. G. Potter; F/O. R. J. H. Strantzen.

KILLED ON ACTIVE SERVICE. — Flt. Sgt. W. R. D. Thomas.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Sgt. O. D. Hodgkison; Sgt. J. G. Ley; F/O. L. C. Perry; Flt. Sgt. W. T. C. Styles.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—W/O. R. S. Bray; W/O. H. C. Redpath.

Royal Canadian Air Force

KILLED IN ACTION.—Flt. Lt. J. R. Menzies; P/O. D. E. Reiber.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—W/O. G. W. Acorn; Sgt. G. D. Arnott; W/O. C. M. Berg; Flt. Sgt. E. J. Berndt; F/O. C. R. Booth; P/O. L. J. E. Cabana; Sqn. Ldr. R. G. Cook, D.F.C.; W/O. H. J. L. Copping; W/O. J. H. Cowieson; W/O. J. A. Grenier; Flt. Lt. V. Y. Haines; Sgt. W. J. B. Ingram; P/O. S. R. Kelso; Flt. Sgt. N. W. McNair; Sgt. E. G. Miller; Flt. Sgt. S. R. Moncrieff; Flt. Sgt. F. P. Morro; Sgt. W. J. Rattigan; P/O. H. M. Schade; P/O. D. G. Scott; F/O. M. V. Snow; Sgt. J. Williamson.

WOUNDED OR INJURED IN ACTION.—Flt. Sgt. N. D. Dixon.

MISSING.—P/O. R. E. Chambers; F/O. H. T. Conlin; P/O. J. G. Curle; F/O. J. L. Dougan; F/O. H. S. Gartrell; P/O. M. Gravel; P/O. P. F. C. Haydock; F/O. C. G. Hutchings; F/O. J. A. R. L. La Palme; Sqn. Ldr. W. R. Moseley-Williams; F/O. R. W. Randall; P/O. J. S. Williamson.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. A. G. Fawcett; P/O. R. Florence; Flt. Sgt. D. C. W. Hamblyn; P/O. H. J. Millar; Flt. Sgt. E. R. Whittington.

MISSING, BELIEVED KILLED IN ACTION.—W/O. J. R. Powell.

MISSING.—F/O. B. J. Hosie.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. L. B. Jameson; P/O. J. L. Oliver.

South African Air Force

KILLED IN ACTION.—Lt. M. Duchen; Capt. R. R. Hart; Lt. B. G. McKenzie; Lt. A. T. Wellington.

MISSING.—Lt. J. B. Miller.

KILLED ON ACTIVE SERVICE.—Act. Cpl. C. M. Murray.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Act. Cpl. L. A. Mills.

Air Transport Auxiliary

Fits' Officer Gilbert Christopher Gould, A.T.A., killed whilst ferrying His Majesty's aircraft in England.

Third Officer Michael George St. John Scelly, A.T.A. (Flying Officer, R.A.F.), killed whilst ferrying His Majesty's aircraft in Scotland.